The IRON AGE
February 26, 1959 A Chilton Publication The National Metalworking Weekly

Burroughs Corp.'s Dr. Irven Travis

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Can Porcelain Enamel Regain Lost Markets? – P. 45

Tips on Bending Welded Steel Tubing – P. 85

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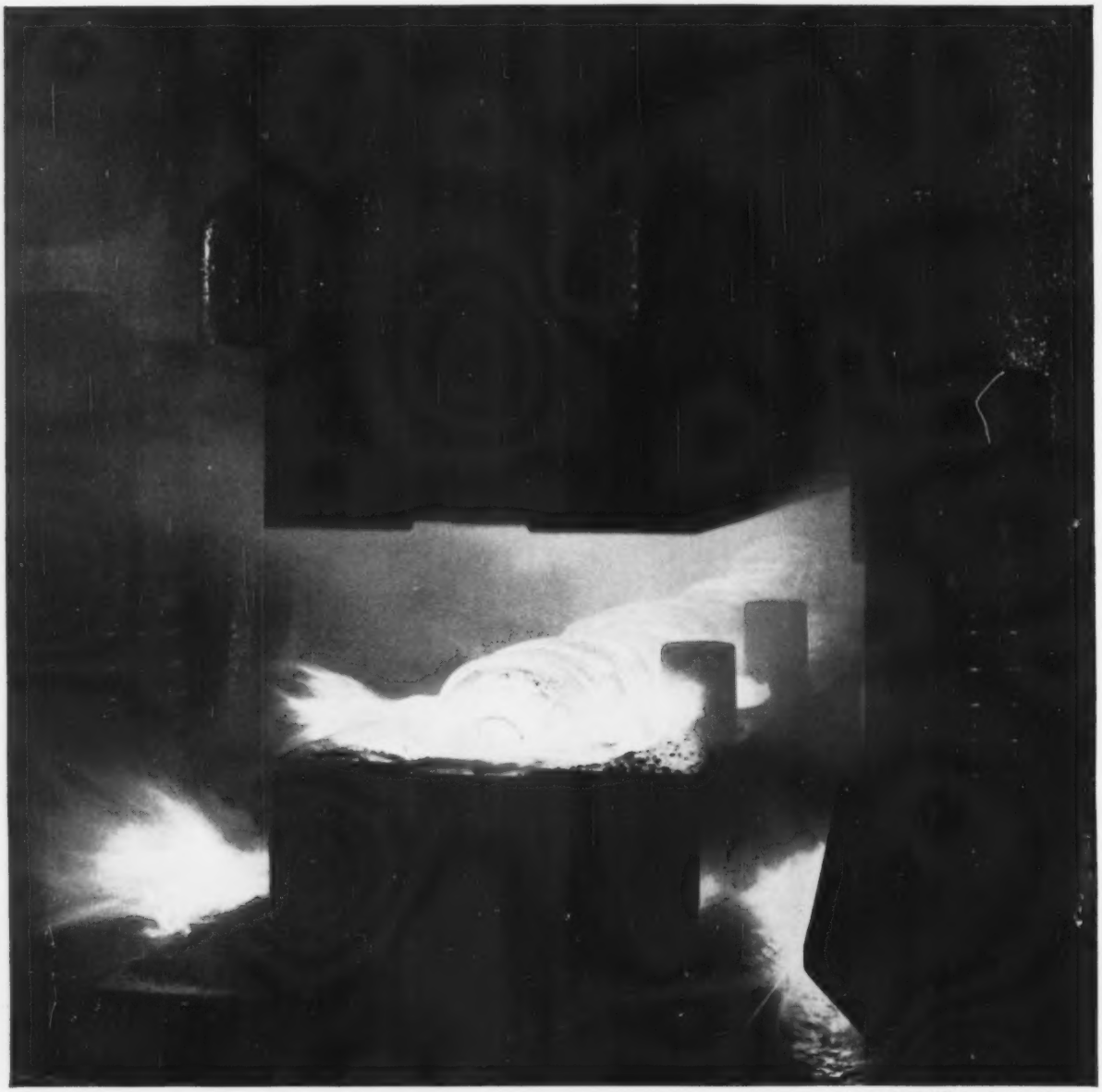

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February 26, 1959—Vol. 183, No. 9

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HOPE FOR ENAMELERS

New Enameling Iron — A new enameling iron may help porcelain

enameling industry to regain lost markets. It could compete pricewise with painted metal. P. 45

LABOR ARBITRATORS

Know How They Think—Presenting your arbitration case properly can be the difference between winning and losing. Arbitrators are fairly consistent in their views on cases involving discipline. P. 48

FLYING AUTO

Progress Being Made—Chrysler's flying jeep, being developed for the Army, is almost ready for flight test. Only slightly bigger than a car, it uses new principle of vertical takeoff. P. 63

IKE WARNS SPENDERS

Taxes Might Be Hiked—If you want to spend big, be prepared to pay the piper, President warns

in Metalworking

MAKING RESEARCH PAY: Burroughs Corp.'s Dr. Irven Travis has some sound words of advice on how to get the most out of creative talent. Matching the man to the project, he says, is a most important first step. P. 59

Congress. Budget battle is a deadly serious business. P. 67

DEFENSE CONTRACT BATTLE

It's East vs. West—New Yorkers are out to trim Farwest's share of defense contracts. And West Coast forces are set to resist any moves to transfer awards east. In '58, California did $1 billion more defense work than New York. P. 69

FEATURE ARTICLES

WELDED STEEL TUBING

How to Plan Bends—For fewer rejects and less breakage, it pays to find out how far you can go in bending. Whether bends are made with or without a mandrel, each method has its own set of specifications and tolerances. There's added benefit in work-hardening of cold-bent tubing. P. 85

SHORT-ARC WELDING

For Thin Sheet Metal—A new welding process works on thicknesses of 0.030 to 0.100 in. A stable buzzing type of arc pinpoints heat for fast welding in all positions and with all types of joints. P. 90

ANNEALING FURNACE

For Stainless Strip — Providing controlled atmosphere and temperatures up to 2100°F, a new furnace produces quality stainless strip. Hanging vertically, the strip heats and cools without ever touching a roll surface. The vertical setup makes a compact unit and requires less muffle. P. 94

BEARING INVENTORY

Eliminate the Duplicates—Why carry a lot of duplicate bearing types in stock for various items of equipment? A bearing survey may show that even though they carry different part numbers, many bearing sets are identical. P. 96

ERASE FORGING DRAFT

To Save Machining Steps—Even if it takes extra steps in the forging shop, elimination of draft can sidestep machining later on. Many designs can be handled by this no-draft method. P. 98

MARKETS & PRICES

NEW CHICAGO MILL

National Makes the Move — National Steel has announced plans for a sheet products mill in the Chicago area. Move may have been timed to get head start on other producers. P. 47

LEAD-ZINC QUOTAS

Not Enough Pressure—The U. S. delegation to the U. N. conference on lead-zinc will be prepared to listen. But opponents of our import quotas are not likely to present a solid front. P. 49

STEEL IMPORTS

Surge Coming—Import shops are springing up like mushrooms in the Midwest and Southwest. Service centers face competition from foreign mill depots. P. 50

NOTE OF PANIC

Steel Market Jitters—A note of panic is creeping into the steel market. More steel users are looking into the possibility of costly conversion deals. P. 129

PURCHASING POLICY

Integration Is Essential — Only through continuing awareness of other company operations can a PA do his best. Charles Steers tells how it is done at Russell, Burdsall & Ward. P. 130

NEXT WEEK

ADHESIVE BONDING

More for Your Dollar—Today's adhesives do a lot more than just stick things together. Next week's feature shows how structural adhesive bonding now stands side by side with mechanical and fusion methods of joining.

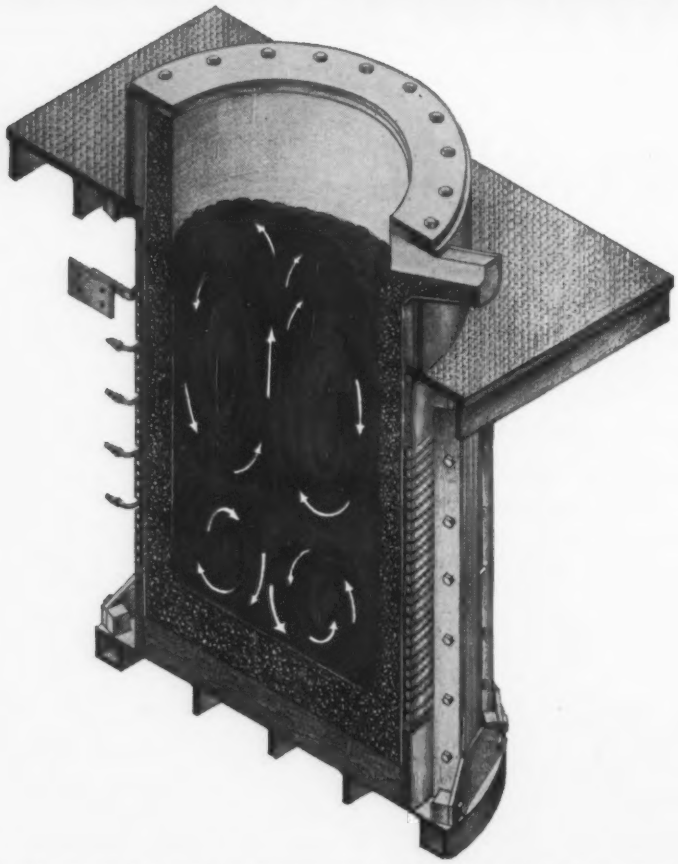
AJAX-JUNKER

a new principle in 60 Cycle induction melting

WHAT IT IS:

WHAT IT CAN DO:

May We Explore the Possibilities of this New Method with You?



- A cylindrical induction coil supplied with ordinary 60 cycle current induces heat and vigorous electromagnetic stirring in the molten metal charge.

  Integrated electric controls regulate power, maintain high power factor automatically.

  Monolithic refractory linings are made by ramming against the sturdy water-cooled coil held in a rigid frame of magnetic and structural steel.

  This new principle was perfected in Europe over the last seven years. Over 100 Junker furnaces are now in use. AJAX-JUNKER designs are based on latest experience, using American components and practices throughout.

- Outstanding results are proven in these fields:

  DUCTILE and ALLOY IRON CASTINGS
  RECOVERY OF IRON TURNINGS
  RECOVERY OF ALUMINUM SCRAP

  Available sizes range from 1 to 10 tons, with normal melting cycles from 2 to 4 hours. Power ratings are 200 kw through 1500 kw.

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. . . . . important words in the steel industry

. . . important because MORGAN stands for creative engineering nurtured by 70 years of acquiring experience in the rolling mill field. MORGAN developed the first continuous rolling mill in the United States—and has consistently maintained pre-eminence in this field. The true test of MORGAN quality and performance is shown in the number of new mills ordered by old customers.

Write for our new booklet which shows, in greater detail, the range of MORGAN mills.

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RM-76

How the Armco Stainless "Wardrobe" of Finishes Can Help You Save

New steels are born at Armco

No matter how they are finished on the outside, Armco Stainless Steels are always the same high-quality, corrosion-resisting steels all the way through. But you can save money by specifying the *one finish* from the Armco Stainless "wardrobe" that best suits your product's needs and requires the fewest additional finishing operations in your plant.

MANY ARMCO FINISHES TO CHOOSE FROM

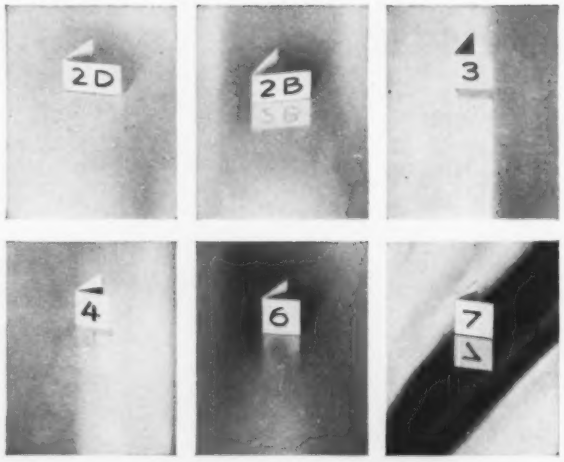
Because they serve in many different products, Armco Stainless Steels are available in a wide variety of surface finishes.

Tough jobs call for workclothes. One of the unpolished surface finishes is generally most economical in high-temperature industrial uses, involving highly oxidizing or very corrosive atmospheres. On the other hand, when appearance, sanitation, or easy cleaning comes first, a polished stainless surface is required.

Patented Armco processes offer additional possibilities. Small parts and intricately-shaped pieces can be economically polished by Armco's electropolishing process. Another Armco process "Ebonizes" (blackens) stainless steel parts.

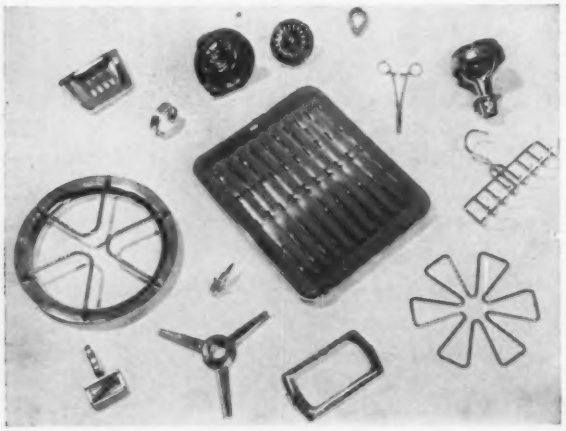
BROAD RANGE OF STAINLESS

Remember, too, Armco Stainless Steels are available in a wide range of standard and special grades—in gages, sizes, and shapes to suit design needs. For more information about Armco's Stainless Steels or their surface finishes, just fill in and mail the coupon or call your nearest Armco Sales Office.



Pictured are six of the eight mill finishes available on Armco Stainless Steels. No. 2B and No. 2D Sheet Finishes correspond to No. 1 and No. 2 Strip Finishes, respectively. Not shown are the hot-rolled, annealed and pickled No. 1 Sheet Finish for industrial products and the new Armco SOFTONE Finish for Type 430 Stainless Steel strip. SOFTONE was developed to provide a soft, lustrous surface, yet avoid mirror-like reflectivity.

Small or intricately-shaped stainless pieces like these can be economically polished by the Armco Electropolishing Process.



ARMCO STEEL CORPORATION, 1569 Curtis St., Middletown, Ohio

I would like more information about:

☐ Armco Stainless Steels

☐ These Armco Stainless finishes_____, _____, _____, _____

NAME_____

FIRM_____

STREET_____

CITY_____ ZONE____ STATE_____

ARMCO STEEL

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

Really Crazy Talk That's What We're Getting

Some of the current economic talk is downright crazy. What's more, it's dangerous.

People who should know better are being influenced by "planners" who want to regulate every facet of our lives.

These do-gooders are boring into every angle of our lives: Wages, prices, schools, credit, welfare, hidden taxes, and whatnot.

Take the conversations and writings on controls. We had them in war times. Even then they were an alleged necessary evil.

Today we hear talk that runs something like this: "We are in a cold war. Prices and wages are running away. Therefore we need controls to obtain stabilization." We would expect left wingers, Socialists, and Communists to embrace such talk. We are hardly prepared to see support for peacetime controls coming from businessmen, labor leaders, and high Administration officials.

Maybe this talk is used as a threat. If so, it is indefensible on any count. Nor is it proper for government people—from whom we have reason to expect more—to keep the control idea under "consideration."

Federal controls would spell the end of what's left of the stamina, imagination, and risk-taking that made this nation what it is—an enlightened haven for the individual. Those who give lip service to peacetime controls over our citizens are either stupid or they wish privately for government control over the people.

To believe that a group of ordinary government, labor, or management officials have the wisdom to dictate what is right for Tom, Dick, and Mary is a tragedy. Such suave arrogance on the part of those who feel controls are "necessary" is deadly. It might open wide the door to the "planners" who have been waiting for years for this opportunity.

No group of well-meaning do-gooders or bureaucrats are a substitute for our free democratic processes. The elected representatives can be "retired" if they mislead us. We don't need "super" planners telling us what to do.

Besides, there are no real superplanners. There are only those who want to control others as a means of relieving their own personal inadequacies.

We don't need controls—but **they** might need a psychiatrist.

Tom Campbell

Editor-in-Chief

What's New

IN STEEL FROM STOCK

New developments will help give you Increased Value in Buying Metals from Ryerson during 1959. Below are just some of the new additions to Ryerson's comprehensive stocks and services.

NEW FASTER MACHINING TUBING...Ledloy® 170—fastest machining steel tubing ever produced, average speed of 170 s.f.m. And only Ryerson has it for shipment from stock. Users report increases of 25% in productivity... longer tool life...improved finish. Sizes available to date from 1" to 2½" O.D. with maximum ⅜" wall thickness.

NOW EVEN FASTER MACHINING LEDLOY BARS...new Ledloy 375 bars boost machinability to record averages of 375 s.f.m. Large stocks of this new steel supplement Ryerson stocks of regular Ledloy 300 free-machining steels to give you widest selection. Available from Ryerson stocks in rounds from ¼" to 1", hexes from ¼" to ⅝".

TWO NEW PLANTS IN TEXAS...the former plants of Vinson Steel and Aluminum Co. in Dallas and Houston are now a part of the Ryerson organization. These plants, already well stocked and equipped, are now backed up by the unequaled facilities of the 18 other Ryerson plants across the nation. This means Texas metal users can now draw on stocks of more than 12,000 kinds, shapes and sizes of steel and aluminum. Also available, full line of industrial plastics and metalworking machinery.

NEW ALUMINUM STOCKS...are being added in Ryerson plants at Cleveland, Philadelphia and Los Angeles. Aluminum stocks at other Ryerson plants have also been greatly expanded.

NEW STOCKS OF T-1 ALLOY PLATES...in two types: to 321 minimum BNH and to firebox quality specs. "321" gives maximum resistance to impact and abrasion. Five sizes available from 3/16" through ⅝". "Firebox" is for applications requiring high strength and toughness...meets ASME code case 1204-3 for pressure vessels. Available in nine sizes from ¼" through 2". Both types offer good weldability.

STAINLESS EXTRUDED ANGLES...now available from Ryerson. They offer better surface and resultant lower polishing costs...cross-section tolerances less than half those of rolled angles for better forming into rings...no increase in price over rolled angles.

INCREASED VALUE IN STAINLESS FROM RYERSON...even though your application may not demand it in every case, you get the ultimate in specification controls when you order stainless from Ryerson—an important increased value without increased cost. Examples: in addition to chemistry specs for Types 304 and 316, you get the added value of controlled mechanical properties and Brinell hardness—and corrosion resistance assured by actual test.

STAINLESS HEADS—NATION'S LARGEST STOCK BY FAR...Ryerson stocks now include every requirement for ASME flanged and dished heads in Types 304, 304L, 316 and 316L in a wide range of gauges and sizes.

RYERSON STEEL®

Member of the INLAND Steel Family

NATION'S MOST COMPLETE SERVICE ON STEEL...ALUMINUM...PLASTICS...METALWORKING MACHINERY

SERVICE CENTERS IN PRINCIPAL CITIES COAST TO COAST

Numerical Setup for Volume

A new application for numerical control forecasts some high-volume jobs. At the plant of a diesel manufacturer, this setup drills, reams and taps a pattern of holes in a family of parts. Because it can switch in a few seconds from one part to another, total volume will be high. Meanwhile controls and machine tool companies say they have other high-production units on the drawing board.

Shot Blast for Ingot Molds

A specially designed shot-blasting machine now cleans large steel ingot molds at the rate of 58 molds per 8-hour shift. In addition to providing a uniformly clean mold surface, the new unit eliminates tedious scratch-brush cleaning. Angular steel shot obtains the best results. The unit operates from air line pressure of 100 psi.

Stainless Extrusions Here

Extrusions in stainless steel receive enthusiastic acceptance by aircraft designers. It should lead to growing demand by other metalworkers. Technique is reportedly well suited to high-volume production. Availability of extrusions should result in lower prices for some stainless components.

Sonics Shows Metal Stress

Recently completed research indicates the feasibility of using high-frequency or low-frequency sound to give a visual image of residual stresses in metals. The system has been applied to square or rectangular bar stock in both aluminum and steel. Metals of any thickness can be tested. The new system detects stresses as low as 100 psi at least.

Barter Bauxite for Wheat?

Aluminum industry is discovering the barter program. One U. S. producer is working out a swap with a source in the Caribbean—bauxite for surplus U. S. wheat. The Commodity Stabilization Service, in charge of the barter, will go all out to keep the transaction in line with what it considers going world prices. But the U. S. company is bound to get the bauxite cheaper than if it paid for it with cash.

Vanadium Developments

Successful production of vanadium alloys includes sheet, as well as bars and forgings. Main advantages of vanadium alloys are: extreme workability, strength, and good weldability. They can be cold-rolled over 98 pct. Strength-to-weight ratio is superior to titanium's. The alloys retain their strength at temperatures of 1200°-1500°F.

Shift from Silica to Basic

Makers of refractories look for boost in sales of basic brick this year. One source estimates that 50-75 pct of all openhearth roofs will have been converted from silica to basic brick by the end of the year. Considering that open hearth roofs have averaged 6 lb of silica per ingot ton produced, this should result in an abrupt shrinkage of the market for silica brick.

High-Temperature Lubricant

A new high-temperature synthetic lubricant oil for jet engines will stand up to 400°F for sustained periods. It's an ester-type base fluid containing selected additives to insure maximum performance. In addition to jet engine use, the lubricant will find other military applications and possible commercial use.

Check Missile Management

Congress tells the Pentagon to do less pondering and take more action in ordering missiles and related equipment. Testimony reveals that too many hands are seriously slowing decisions on national missile strategy. Records of Army-Navy-Air Force missile management show that officials spend as much time bickering with one another over missiles to order as contractors take to build them.

Held down "impossible" job for months vs. days

They were asking the "impossible" at this big West Coast mine. The hose used in their big beneficiation plant must be tough enough to handle the flow of murderously abrasive iron-ore slurry. Yet it still must be flexible enough to follow a twisting, bending course down from the top of the seven-story structure.

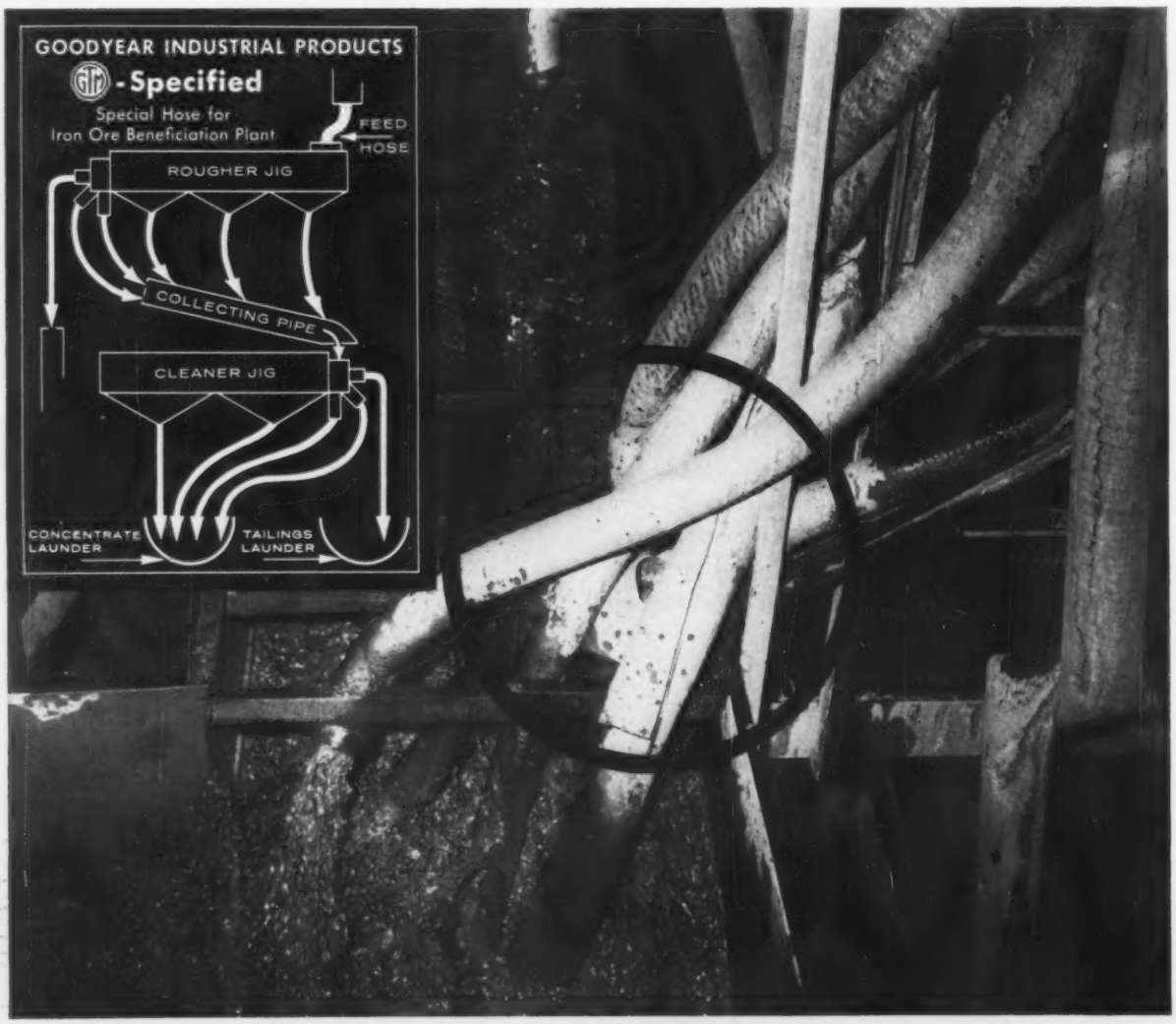
So it's little wonder their first hose sprang numerous leaks almost immediately – was finished completely in about 45 days. It wasn't until the G.T.M. – Goodyear Technical Man – recommended his special ore-carrying hose that they got satisfactory service.

In fact, the G.T.M.'s hose has been so successful that the company's purchased over 4,000 feet of it to date. It's been on the job over 12 months now – completely mastering this extra-tough job.

So once again, the G.T.M. has proved that the "impossible" often boils down to right hose – and the right recommendation. Make sure you get both–by contacting your Goodyear Distributor – or writing Goodyear, Industrial Products Division, Akron 16, Ohio.

• • •

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on V-Belts, Hose, Flat Belts and many other industrial rubber and non-rubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*



HOSE FOR ALL INDUSTRY BY

GOODYEAR

THE GREATEST NAME IN RUBBER

FATIGUE CRACKS

All Hail the Engineer

This week — February 22-28— we join the nation in celebrating National Engineers' Week.

Theme for the observance—sponsored by the National Society of Professional Engineers—is "Engineering . . . For the Age of Space."

Aim of the annual celebration is "stimulating a greater understanding of the contributions of the engineering profession, and emphasizing the importance of safeguarding America's future with progress in science and technology."

In announcing the event, President Eisenhower declared, "The observance of National Engineers Week provides an opportunity to recognize the vital work our engineers perform in maintaining American superiority in technology. I am heartened by the sense of urgency and public responsibility displayed by American scientists and engineers, and by their determination to be of service to the nation.

"The priority given by engineers and scientists to education is a strong example to us all. Their efforts to alert young people to the importance of careers in science and engineering help to enlarge the basic resources of American intellectual talent. It is only by education that we can guarantee the future supply of leadership in all fields of endeavor."

But while directing their eyes and aims upward, on space projects or other jobs, engineers and research men must also keep both feet on the ground.

Industrial research efforts should be geared to improving a company's profit picture. That's why we believe you'll find "How to Make Research Efforts Pay Off" (p. 59) an important article.

Written by Dr. Irven Travis, vice president-research and engineering, Burroughs Corp., it contains some valuable suggestions on directing research for profit.

Incidentally, if you'll take another look at the cover picture of Dr. Travis, you'll see some interesting equipment as well as the doctor and two technicians.

They are working on the data processing system of SAGE (Semi-Automatic Ground Environment) the nationwide radar and data processing network.

This Burroughs unit is the chief building block of SAGE. Some of the things it will do are amazing. It accepts raw video data from all search radar types now in use, defines the target, and figures range deviation to a minimum. Then it rechecks, all within a second.

Rule of Thumb

Getting the right man in the right job is just as important in the Army as it is in industry. To put round pegs into round holes and square pegs into square holes, some professional military men use these tests:

Bright and busy types: Make them line officers.

Bright and lazy types: Make them staff officers.

Stupid and lazy types: Let them find their own level.

Stupid and busy types: Reassign them before they wreck the division.

CONTROL

ALUMINUM HOMOGENIZING TO + OR — 5° F.

R-S CARHEARTH FURNACE HANDLES 25 TONS PER DAY

Uniformity hour after hour . . . day after day with a variation of only plus or minus 5°F. That's the record set by an R-S gas fired, double end, carhearth forced convection homogenizing furnace at the Bohn Aluminum & Brass Co. This particular installation is homogenizing a charge of 50,000 lbs. of aluminum billets at a maximum temperature of 1150°F.

Other R-S Carhearth Furnaces now in use are handling production in excess of 80 tons daily and maintaining the same uniformity in every heat. These and many other specialized heat treating furnaces are designed, developed and built by R-S to reduce production time, cut costs and improve the quality of the finished product.

Why not put these savings to work in your plant? Write today for the booklet that points the way to better heat treating. Ask for RS-200. Send your request to . . .

R-S FURNACE CO., INC.
NORTH WALES, PA.

R-S FURNACES

"Task-Forged" part reduces tractor inventory, sparks sales feature for Minneapolis-Moline

A three-in-one farm tractor that permits quick interchange of three different front wheel assemblies! Minneapolis-Moline came up with this great idea for increasing product salability and reducing inventories – both at the factory and with its dealers.

Key part in the multi-purpose unit was a steering link component. It had to be strong enough to steer and support the front end of the tractor–including the various wheel assemblies–yet light enough for one-man handling. A forging? Of course! Minneapolis-Moline designed it as a drop forging because it had an unusual dovetailed groove in the head and an off-center shaft to boot.

The "Task-Forging" team at COMMERCIAL, working closely with Minneapolis-Moline engineers, proved that the "idea" steering link component could be better produced as an upset forging on their 6" upsetter–and with many cost-saving advantages to Minneapolis-Moline.

To begin with, the upset forged link saves considerable forged metal. All flash metal is virtually eliminated. Still more forged metal is saved because the upset forging is made from a round bar – involves no forging draft.

The upset forged link lowered machining costs and greatly improved machining conditions. There's less metal to be machined and it's better positioned for easier removal. Furthermore, there's no heavy part line at 180° to cut through. Tool breakage is no problem either because tool speed and feed is constant and continuous.

From an upset forging of 27 lbs. to a finished machined part of 22½ lbs. –there's positive proof of the important savings forging makes possible in both forged metal and machining.

Perhaps you're looking for help in the forming of a new "idea" part. Or, you may be seriously considering an improvement in the forming of an already existing part. In either case, "Task-Forging", COMMERCIAL'S new metal forming service may be able to help you. Write to Commercial Shearing & Stamping Company, Dept. K-9, Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping

Labor Troubles

Sir—I would appreciate your sending approximately one dozen copies of "Strengthen First-Line Supervision To Avoid Labor Troubles" by Robert N. McMurry which appeared in the Feb. 5 issue.

I believe this to be one of the most worthwhile articles on the subject.—R. M. Ettington, Asst. to the Gen. Engr., Ingersoll-Rand Co., Painted Post, N. Y.

Sir—Please forward to me at least three reprints. This article is very well written and has amazed our first line personnel.—Harold T. Norga, New England Malleable Iron Co., Lincoln Park, R. I.

Steel Capacity

Sir—I would like to congratulate you for the manner in which you prepared the steel capacity report in the Feb. 5 issue. It is a very interesting and comprehensive report.

I would appreciate receiving two additional copies. — Noel Seguin, Secretary to Div. Supt., American Steel & Wire Div., U. S. Steel Corp., Cleveland.

Lead Glass

Sir—You recently carried a letter from a Mr. J. Sheheen which states in part, "the addition of lead . . . in the glass phase . . . helps . . . insulating values but only at low temperatures. This glass has a negative coefficient of resistivity and fast, resulting in poor electric and heat insulation at higher temperatures."

Although this statement is essentially true, Mr. Sheheen seems to confuse the action of lead oxide with the effect of any vitreous phase in ceramics. It is true lead glasses have a negative temperature coefficient of resistivity, but so do all other generally known glasses. Furthermore, at high temperatures (around 500-600°C) the degradation of electrical resistivity becomes so extensive that all generally known glasses are no longer normally useful as dielectric materials.

Within the useful temperature range, lead glass will generally have higher resistivity and lower dielectric loss than other types of glass. Lead is used extensively in electrical glass because of: (1) good electrical properties; (2) its ability to promote low temperature fluidity and increase the chemical stability of the resulting glasses.

Mr. Sheheen also commented about the lack of stability of lead oxide at very high temperatures. Due to the position of lead in the electromotive series, reduction of the oxide will take place when melted in a reducing atmosphere. Moreover, if a glass containing lead oxide is brought into contact with a more strongly electropositive metal surface, such as iron, while in the molten state, the lead oxide will be reduced to metallic lead. These phenomena are not serious problems as they are well known and can be avoided during processing.—S. W. Turner, Lead Industries Assn., New York.

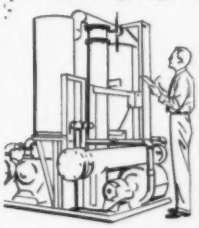
"You'll like Mr. Abernathy—or else!"

Carl G. Paulson, Director of Hayes Research and Development Group, Reports...

NEW NITROGEN POTENTIALS

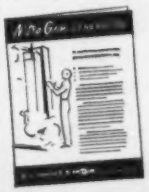
Assume you face the need for high purity nitrogen at a low per-unit cost figure. You want to use it as a heat treating atmosphere . . . or as a "blanket" for hydrocarbons or food products . . . or for any one of a number of industrial applications. How can you bring this safe, inert gas out of the lab and into general use without inflating your costs?

Our R & D group reasoned that a low cost generator was the logical solution and followed up and developed a completely new piece of equipment—the C. I. Hayes "Nitro-Gen." This unique combination of stationary retort and cyclical programmed dryer has cleared the way for production of 99.99% pure inert gas at approximately 20c per thousand cubic feet.



The immediate benefits of low cost nitrogen as a protective heat treating atmosphere were revealed in initial metallurgical applications. For example, test bars of Type 8670 Carbon Steel were subjected to routine hardening under (1) nitrogen, (2) dissociated ammonia, and (3) endothermic gas atmospheres—each test followed by routine oil quench and tempering. Hardness results from these tests proved identical . . . but a substantial boost in toughness showed up in the bars treated under nitrogen. The nitrogen atmosphere produced 100% greater toughness, according to a transverse break test.

Safety alone makes nitrogen worthy of careful consideration. If this noncombustible gas can be produced efficiently and economically (and we're doing it!), Hayes Research and Development Engineers believe its potential — in heat treating and in *other "blanketing" operations* — is virtually unlimited. For further details on the new "Nitro-Gen" . . . now being demonstrated in our lab . . . request technical data.



Established 1905

C. I. HAYES, INC.

821 WELLINGTON AVE. • CRANSTON 10, R. I.

Whatever the job, **it pays to see HAYES** for metallurgical guidance, laboratory facilities, furnaces, atmosphere generators, gas and fluid dryers.

POSITIVE DUPLICATION – EVERY TIME!

(PD)° Distinctive bullet markings occur every time a bullet leaves the same gun barrel. The barrel rifling grooves the slug, making possible *positive identification*—an important contribution to the science of ballistics.

WHEELS MATCHED TO MACHINE

Just as a bullet is matched to a gun barrel, so CINCINNATI (PD) CENTERLESS WHEELS (like those shown above) are matched to your centerless grinding jobs. Thirty-five years of centerless grinding experience back up each application of CINCINNATI (PD) WHEELS to your operation.

PRECISION PERFORMANCE

And every time—time after time—when you reorder a CINCINNATI (PD) WHEEL, it will act and grind exactly like the original. The Positive Duplication of wheel grades by the remarkable (PD) manufacturing process *will help maintain your production*—and save you both time and money.

Whatever CINCINNATI (PD) WHEEL you specify . . . centertype, centerless, internal, surface, toolroom, or snagging wheel . . . you get Positive Duplication—every time!

APPLICATION BY SPECIALISTS

Here's another advantage for you. Each one of our factory representatives is a highly trained and experienced specialist in grinding machine set-ups and operations. For his help on those extra-tough grinding problems, call your CINCINNATI (PD) GRINDING WHEEL distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI°

GRINDING WHEELS

°Trade Mark Reg. U. S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

COMING EXHIBITS

Western Metal Show — March 16-20, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles. (American Society for Metals, 7301 Euclid Ave., Cleveland 3.)

Corrosion Show — March 16-20, Chicago. (National Assn. of Corrosion Engineers, 1061 M & M Bldg., Houston 2, Texas.)

1959 Nuclear Congress—Apr. 5-9, Cleveland Auditorium, Cleveland. (Engineers Joint Council, 29 W. 39th St., New York 18.)

Welding Show—Apr. 6-10, International Amphitheatre, Chicago. (American Welding Society, 33 W. 30th St., New York.)

Engineered Castings Show — Apr. 13-17, Sherman and Morrison Hotels, Chicago. (American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill.)

Packaging Exposition—Apr. 13-17, International Amphitheatre, Chicago. (American Management Assn., 1515 Broadway, N. Y.)

Powder Metallurgy Show — Apr. 20-22, Sheraton - Cadillac Hotel, Detroit. (Metal Powder Industries Federation, 130 W. 42nd St., New York 36.)

Design Engineering Show — May 25-28, Convention Hall, Philadelphia. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Material Handling Show — June 9-12, Public Auditorium, Cleveland. (Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22.)

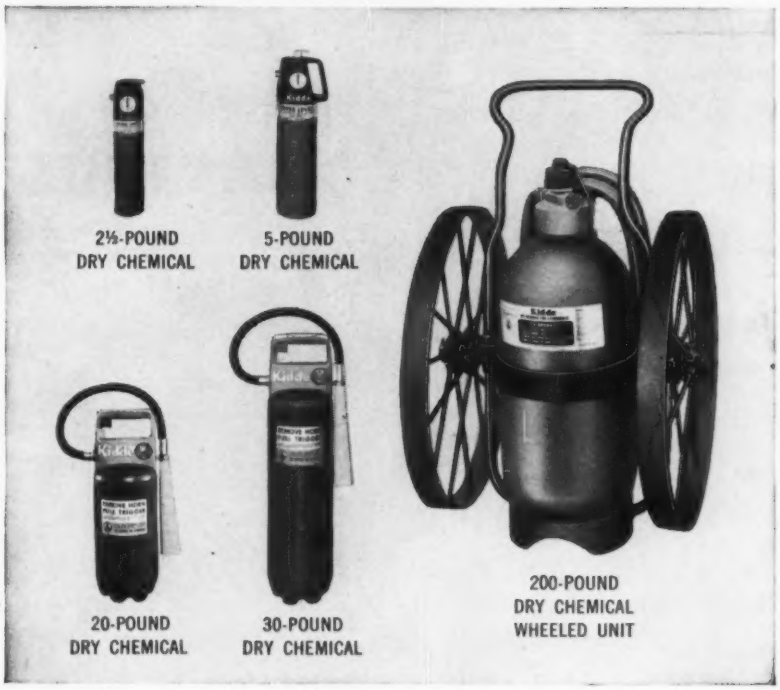
MEETINGS

MARCH

Steel Founders' Society of America —Annual meeting, Mar, 9-10, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland.

(Continued on P. 16)

Now! FULL-POWER Fire Fighting with this complete dry chemical line!



Kidde top-rated portables and wheeled units kill more fire...faster!

From the powerful new 2½-pound portable, on up to the giant 200-pound wheeled unit, Kidde dry chemical extinguishers pack the *extra* punch needed for stubborn blazes, for *full-power* fire fighting. Available in pressurized 2½, 5, 10, 20 and 30-pound capacities, Kidde dry chemical portables feature simple, one-two operation, are easiest of all portables to operate, even while wearing gloves. Kidde portables have no valves to turn, no pins to pull, need no bumping or inverting. Just aim, pull trigger, and fire's out! All are quickly and easily pressurized, have dust- and moisture-proof gauges which show at a glance when unit is charged.

The 200-pound Kidde pressurized wheeled unit discharges a 40-foot dry chemical stream faster, has an *extra* 50 pounds of fire-smothering dry chemical to knock down fire quicker. It's faster and easier to operate . . . just remove pin, swing toggle lever, and flip on-off lever. Easy to maneuver because of its low center of gravity and larger wheels. Truly a one-man fire engine!

All Kidde extinguishers are granted top rating by Underwriters' Laboratories, are the finest extinguishers on the market today. Get more information about this *complete* line of *full-power* fire fighting equipment. Write to Kidde today!

Kidde

Walter Kidde & Company, Inc.
249 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

"We can see the SAVINGS

since we switched to Wheelabrator® Steel Shot"

A single pound of Wheelabrator Steel Shot, as shown in the hands of Mr. R. L. Smith, Forging Engineer at the Broderick Co., Division of Harsco Corp., Muncie, Indiana, cleans the forgings shown in the large pile. The same quantity of malleable abrasive formerly used could clean only the quantity represented by the small pile.

"The same cleaning production is handled in half the former time with 57% less abrasive," says Mr. Smith. "While cleaning production increased from 275 tons to 642 tons of forgings per ton of shot used, abrasive costs were reduced 43%."

And as a bonus benefit, blasting with Wheelabrator Steel Shot has improved the surface appearance of Broderick's forgings, adding to their customer's satisfaction.

Your Wheelabrator Abrasive Engineer will help you make similar savings in your blast cleaning operations. Write for details of this blast cleaning efficiency engineering service.

WHEELABRATOR
CORPORATION

ABRASIVE DIVISION
510 South Byrkit Street Mishawaka, Indiana
Canadian Offices: Scarborough (Toronto) – Montreal
World's Largest Manufacturer of Steel Abrasives

EXHIBITS, MEETINGS

(Continued from P. 15)

International Acetylene Assn.—Annual convention, Mar. 9-10, Hotel Roosevelt, New Orleans, La. Association headquarters, 30 E. 42nd St., New York 17.

Fire Equipment Manufacturers Assn., Inc.—Annual meeting, Mar. 11-12, Barbizon-Plaza Hotel, New York. Association headquarters, 759, One Gateway Center, Pittsburgh.

Pressed Metal Institute — Annual spring technical meeting, Mar. 11-13, Pick-Congress Hotel, Chicago. Institute headquarters, 3673 Lee Rd., Cleveland 20.

American Institute of Chemical Engineers—National meeting, Mar. 15-19, Haddon Hall, Atlantic City, N. J. Institute headquarters, 25 W. 45th St., New York 36.

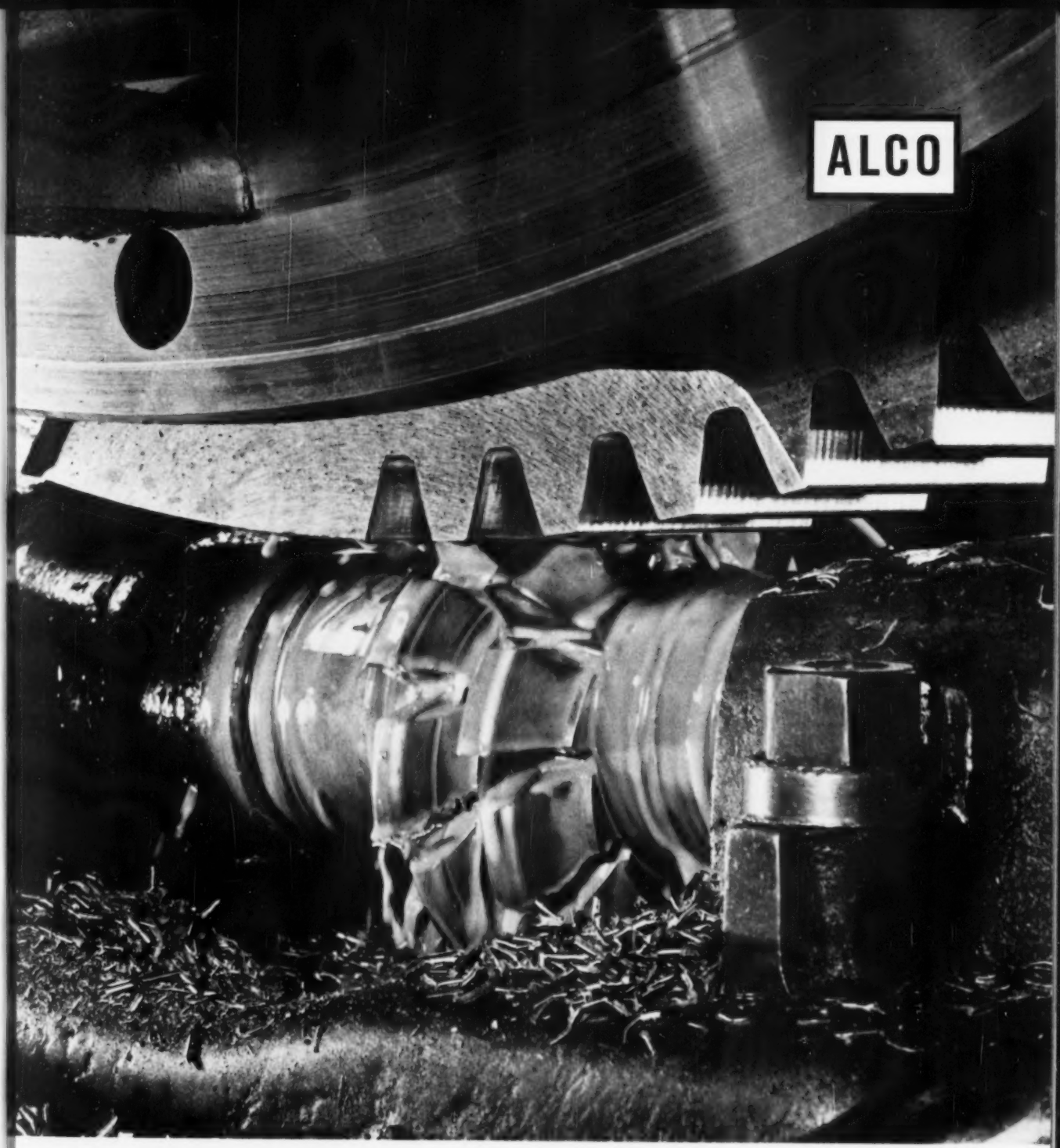
Society of Automotive Engineers—National passenger car, body, and materials meeting, Mar. 16-18, Sheraton-Cadillac Hotel, Detroit. Society headquarters, 485 Lexington Ave., New York 17.

Society for Non-destructive Testing, Inc. — Western regional convention, Mar. 16-20, Ambassador Hotel, Los Angeles. Society headquarters, 1109 Hinman St., Evanston, Ill.

Investment Casting Institute—Meeting, Mar. 17-19, The Surf Rider, Santa Monica, Calif. Institute headquarters, 27 E. Monroe St., Chicago.

American Machine Tool Distributors' Assn.—Spring meeting, Mar. 17-19, The Sheraton-Park Hotel, Washington, D. C. Association headquarters, 1900 Arch St., Philadelphia.

Electronics Industries Assn.—Quarterly meeting, Mar. 18-20, Statler Hotel, Washington, D. C. Association headquarters, 1721 DeSales St., N. W., Washington.



A new opportunity for machining cost reductions...

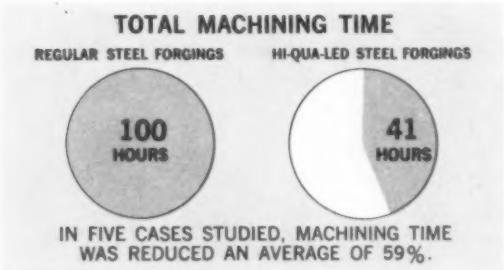
If your ratio of machining cost to stock cost is more than 1 to 1, you can profit by using...

ALCO'S HI-QUA-LED STEEL FORGINGS

ALCO's easy-to-machine Hi-Qua-Led Steel® forgings are speeding up production and cutting costs on machining jobs throughout industry. While retaining all the desirable mechanical properties of regular steel in any AISI grade, ALCO's special-process leaded steel forgings provide opportunities for significant cost reductions in three important areas: machine time, tooling and surface finish.

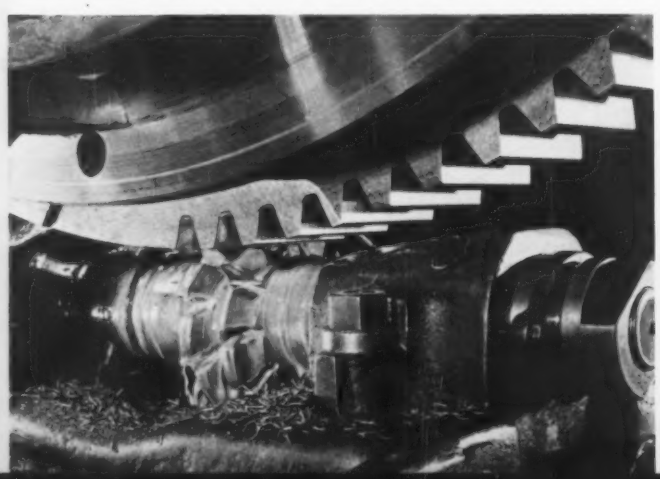
COST REDUCTION NO. 1

HI-QUA-LED STEEL REDUCES MACHINE TIME


TOTAL MACHINING TIME
REGULAR STEEL FORGINGS
HI-QUA-LED STEEL FORGINGS
100 HOURS
41 HOURS
IN FIVE CASES STUDIED, MACHINING TIME WAS REDUCED AN AVERAGE OF 59%.

The lead additive in ALCO's Hi-Qua-Led Steel forgings tends to lubricate the cutting action of tools. This permits heavier cuts and higher cutting speeds for faster removal of metal. As a result, many users have made significant cost reductions by cutting machining time more than 50%.

8-HOUR JOB DONE IN 3—One manufacturer reports that roughing and finishing a gear formerly required 8 hours and 8 minutes. With the freer machining Hi-Qua-Led Steel and the increased speeds it permits, the job is now done in 3 hours.

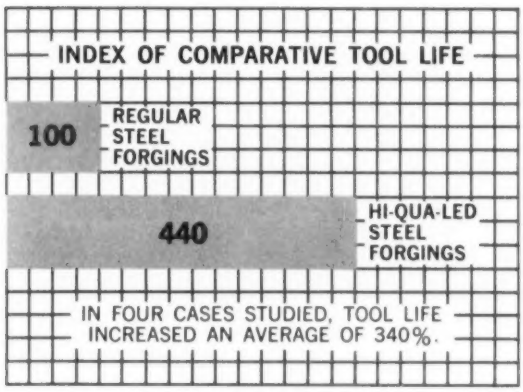


TOOL DOES 3-TIMES THE WORK—Lower frictional properties of Hi-Qua-Led Steel forgings enable another manufacturer to obtain 10 pieces per tool grind as compared to 3 pieces with non-leaded steel. And surface finish is also greatly improved.

ALCO

COST REDUCTION NO. 2

HI-QUA-LED STEEL INCREASES TOOL LIFE


INDEX OF COMPARATIVE TOOL LIFE
100
REGULAR STEEL FORGINGS
440
HI-QUA-LED STEEL FORGINGS
IN FOUR CASES STUDIED, TOOL LIFE INCREASED AN AVERAGE OF 340%.

The reduced friction characteristic of Hi-Qua-Led Steel forgings also provides outstanding opportunities for increased tool life. Leading manufacturers report increases of 200%, 700%, even 1600%. With friction sharply reduced, tools operate at lower temperatures. As a result they cut more efficiently, require fewer grinds, and tool breakage is practically eliminated.

COST REDUCTION NO. 3

HI-QUA-LED STEEL GIVES SUPERIOR SURFACE FINISHES

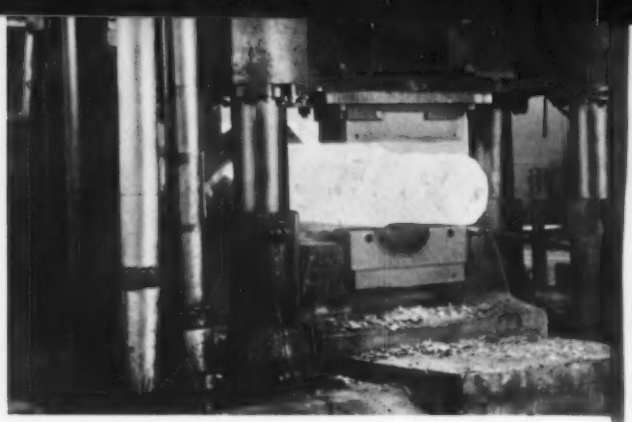
IN ALL CASES STUDIED, SURFACE FINISH WAS GREATLY IMPROVED

ALCO's Hi-Qua-Led Steel forgings assure cleaner cuts and better chip formation resulting in much smoother surface finishes. For some jobs a roughing tool may be used to obtain the desired finish. This superior machinability also assures much closer tolerances.

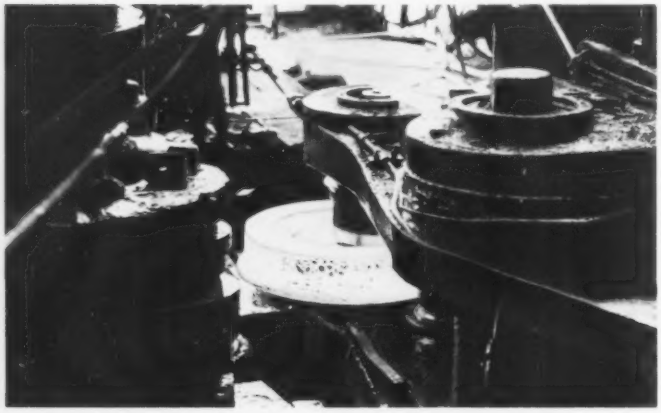
SAVES FULL WORK WEEK—The improved machining qualities of Hi-Qua-Led Steel forgings have reduced gear cutting time for another manufacturer. A job that formerly required 65 hours is now completed in 25, thus saving a full work week.

TOOL LIFE EXTENDED 700%—In a trepanning operation, a manufacturer reports tool life increased from one to eight pieces with Hi-Qua-Led Steel forgings. Tools operate at greatly reduced temperatures and provide better chip formations.

STEELMAKING—To assure highest-quality forgings, ALCO makes its own steel—to customer specifications—in either regular or Hi-Qua-Led grades, or austenitic stainless.



FORGING—With uniform temperatures throughout, ALCO ingots are forged to rigid standards of forging reduction for proper grain refinement and dense, uniform structure.



ROLLING—Hundreds of different rolls make possible an almost unlimited variety of cross-sections for ALCO ring forgings. Mandrelled ring forgings are also available.

MACHINING—ALCO forgings are normally supplied in rough-machined condition but can be shipped finish-machined if specified. ALCO makes shafts up to 40-ft long, rings up to 12-ft in diameter.

FROM STEELMAKING...THROUGH ROUGH MACHINING ALCO BUILDS QUALITY INTO EVERY FORGING

Completely integrated production means better quality control. That's why ALCO *makes its own steel*...and why you are assured a quality forging in exact conformance to your specifications, whether regular or Hi-Qua-Led Steel.

If your ratio of machining cost to stock cost is more than one to one, you can't afford *not* to investigate the advantages of Hi-Qua-Led Steel. Your ALCO representative will be glad to arrange for a test on your own machines.

Contact your nearest ALCO sales office or write for complete information to: ALCO Products, Inc., Dept. 156, Schenectady, N. Y.

SIZES AVAILABLE

Open die forgings—rectangular
Maximum width—32 in.
Maximum height—32 in.
Maximum length—40 ft
Maximum weight—36,000 lb
Minimum weight—1,000 lb

Open-die forgings—rounds
Maximum OD—36 in.
Maximum length—40 ft
Maximum weight—36,000 lb
Minimum weight—1,000 lb

Mandrelled ring forgings
Maximum OD—82 in.
Minimum OD—24 in.
Maximum width—60 in.

Rolled ring forgings
Maximum OD—145 in.
Minimum OD—18 in.
Maximum width—24 in.

ALCO

ALCO PRODUCTS, INC.
NEW YORK
SALES OFFICES IN PRINCIPAL CITIES

LOCOMOTIVES · DIESEL ENGINES · NUCLEAR REACTORS · SPRINGS · STEEL PIPE · FORGINGS · OIL FIELD EQUIPMENT

Gets 40% savings in coolant costs by change to

Standard's Transparent Coolant

ARGON Oil No. 4

Chicago Saws, Inc., realizes other benefits in switch to this Standard Oil product

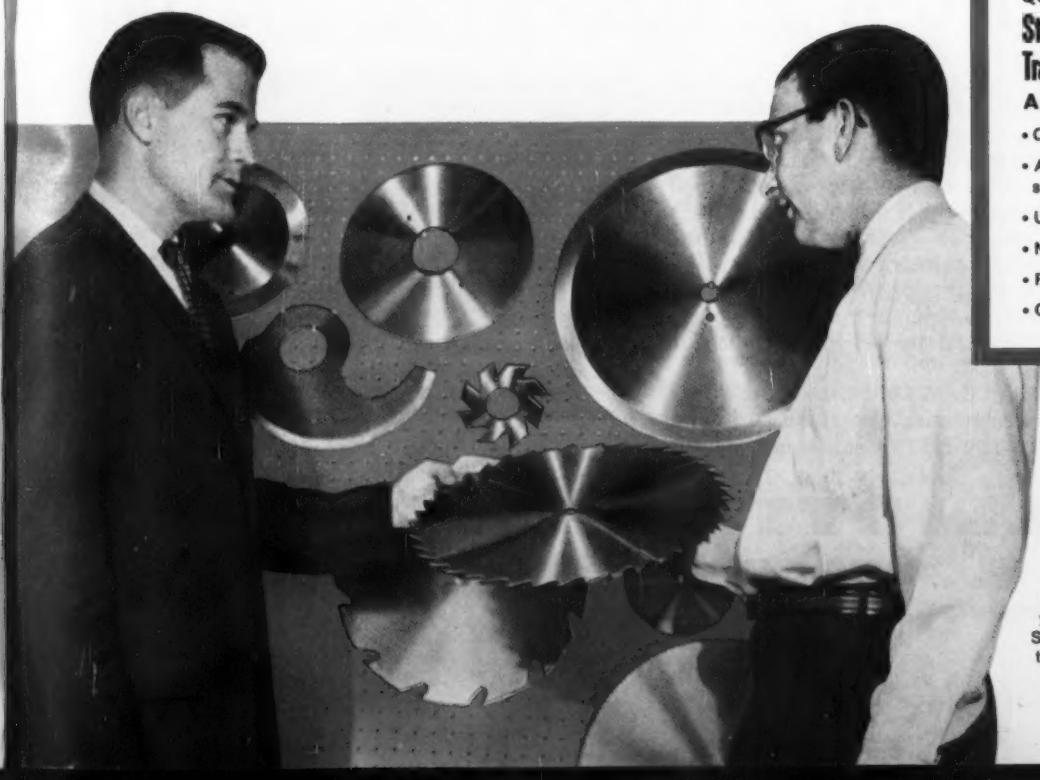
Situation: It all started when a Standard Oil lubrication specialist recommended ARGON Oil No. 4, Standard's transparent coolant to Chicago Saws for use in their grinding operations. This manufacturer of rotary saw blades decided to give it a try. They knew the product was the result of more than three years' work in Standard's research laboratory, and that it had been extensively field tested.

What happened: Using ARGON Oil No. 4 in 100:1 concentration, Chicago Saws was able to reduce coolant costs 40%. They also found the work could be seen more clearly when using this coolant. There was less wheel loading. They also discovered the coolant didn't foam and that its exceptional ability to carry off heat resulted in cooler operation. Faster cuts were obtained with finer wheels. Tolerances were easier to hold. Better finishes were obtained. Less frequent wheel dressings were required.

What you can do: Get more information about ARGON Oil No. 4 transparent coolant. Call the Standard Oil lubrication specialist near you in any of the 15 Midwest or Rocky Mountain states. Or write: **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Using ARGON Oil No. 4, Chicago Saws gets better finish at savings of 40% over other coolants tried. Operator is using .004" cut on heat treated Rockwell 60 C steel.

You expect more from STANDARD *and you get it!*



Quick facts about

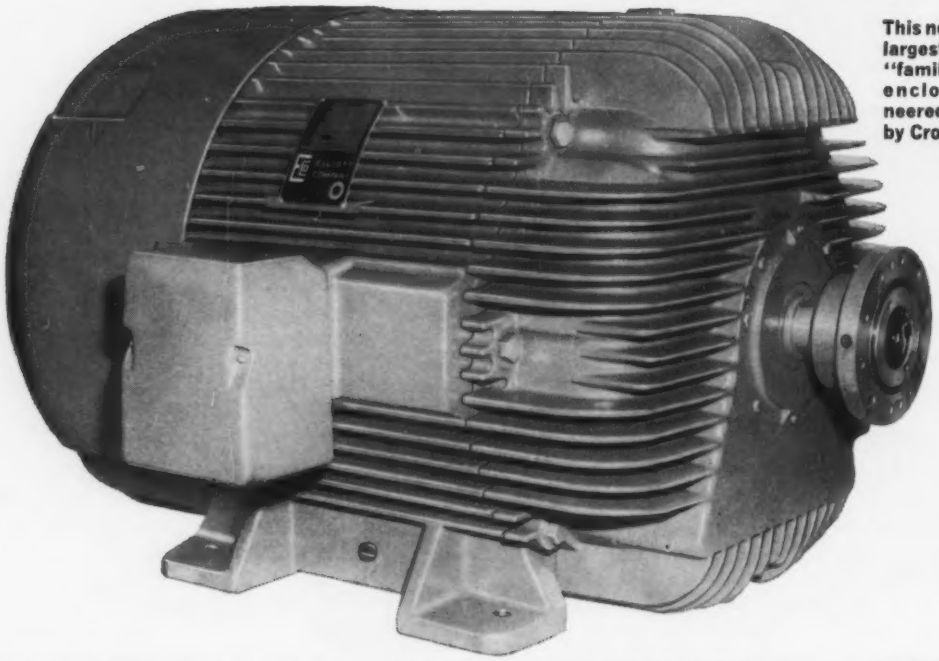
Standard's Transparent Coolant

ARGON Oil No. 4

- Clear, transparent fluid
- All chemical. Does not support bacteria growth
- Unaffected by humidity
- Nonfoaming
- Fire resistant
- Odorless

Standard's Bob Stark and Chicago Saws' vice president Paul Bostrom discuss blades and coolants. Bob Stark is well qualified to work with manufacturers on the use of metalworking coolants. Bob has a chemistry degree from Illinois College plus three years' experience at Standard. He has completed the Standard Oil Sales Engineering School course.

BETTER COOLING MEANS LONGER LIFE LESS MAINTENANCE



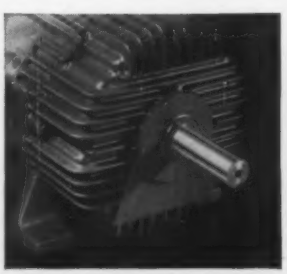
This new 300-hp unit is the largest of the Elliott C-W "family" of ribbed-frame enclosed motors, pioneered in the United States by Crocker-Wheeler.

ELLIOTT C-W SEALEDPOWER MOTORS

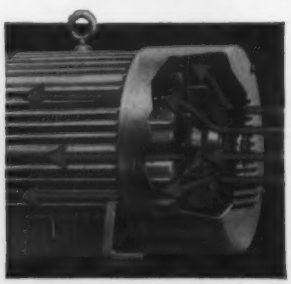
The numerous thin, deep ribs of Elliott C-W SEALEDPOWER Motors are the most advanced development of the ribbed construction, pioneered in the United States by Crocker-Wheeler. Modifications of SEALEDPOWER totally-enclosed fan-cooled motors include explosion-proof designs in all ratings up to 300 hp. Either open greasable or pre-lubricated bearings can be furnished.

Highly-effective sealing prevents entrance of moisture, dust, dirt, corrosive materials; consequently these motors can be depended upon for long, trouble-free service.

In numerous cases, SEALEDPOWER motors are proving to be more economical than standard open motors because of their low maintenance and dependability.



Extra fins keep bearing cool. This potential trouble spot is effectively cooled by the generous extra fins seen in the photograph above.



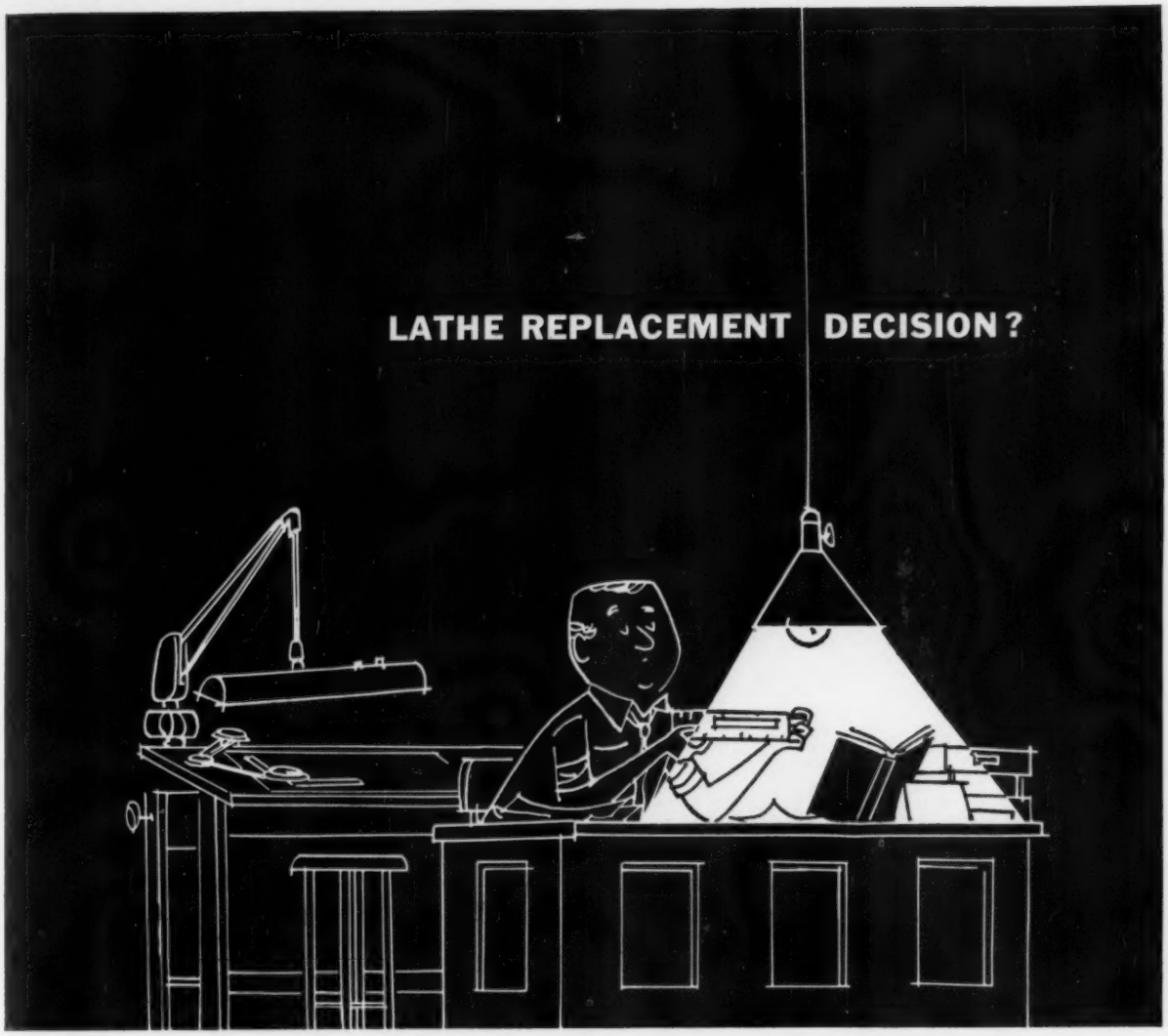
Cooling blast hugs frame. Air is directed along fins extending entire motor length. Easy to clean — no enclosed cooling passages to clog up.

Newest data on modern enclosed motors—including explosion-proof—is given in Elliott Bulletin PB 6000-2. Send for free copy today.

ELLIOTT Company

CROCKER-WHEELER PLANT JEANNETTE, PA.

W6-2



make it logical . . . . easier, too!

LOOK AT LODGE & SHIPLEY POWERTURN

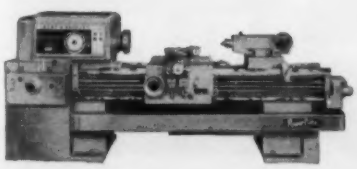
In turning . . . as in every manufacturing operation . . . there are "economic facts of life." Industry constantly demands more and better production at lower cost. This need has been filled by POWERTURN Lathes – demonstrated by case histories (available on letterhead request), which reveal thousands of dollars in cost reduction and higher output.

Base *your* replacement decision on a comparison of *any equipment* with the economic advantages assured by a really new Lodge & Shipley Lathe. POWERTURN facts will help you make a logical decision.

See details in Sweet's Machine Tool File, contact local representative through Yellow Pages or write direct for Bulletin L-104.

The Lodge & Shipley Co., 3073 Colerain Ave., Cincinnati 25, O.

Lodge & Shipley POWERTURN . . . faster, more accurate and specifically designed for newest cutting techniques and toughest alloys.



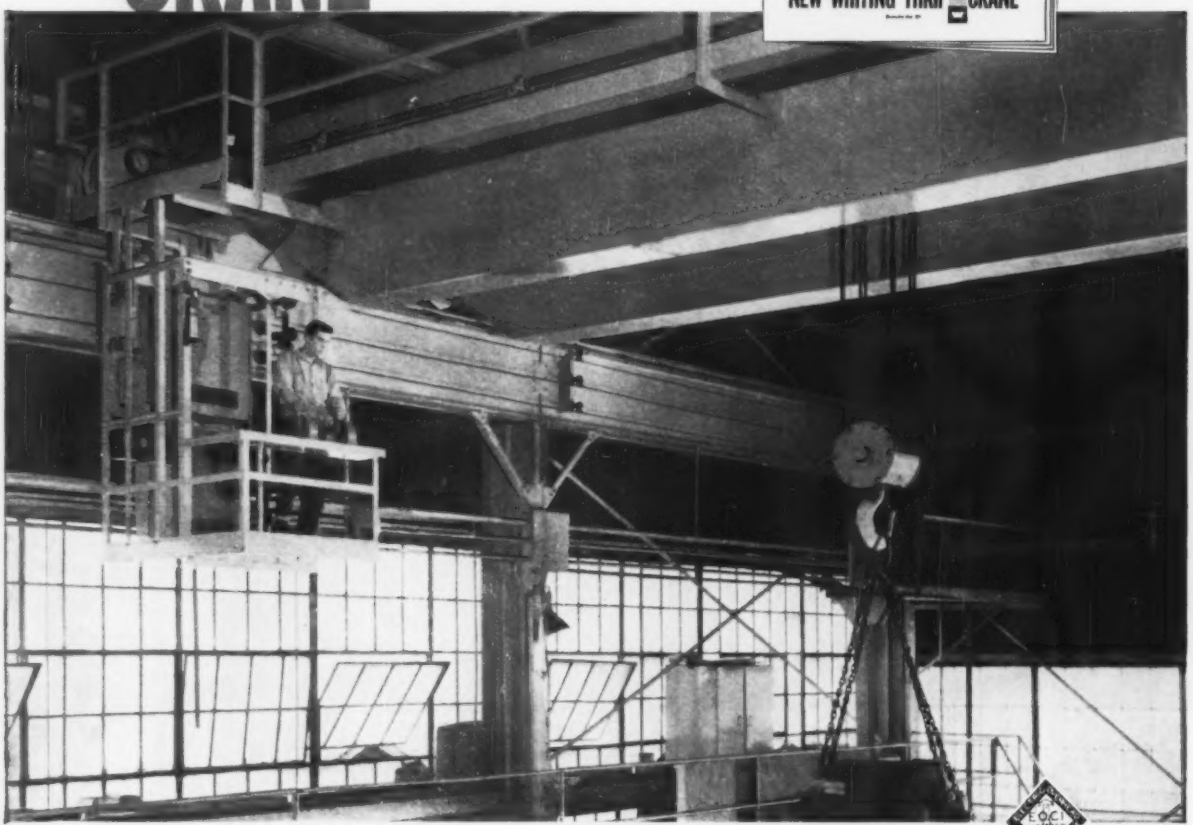
Lodge & Shipley ... your LODGE-ical choice

NEW THRIF-T CRANE

SEND FOR NEW BOOKLET
Bulletin 91 giving detailed information.

Keep your capital investment down

with the NEW WHITING THRIF-T CRANE



An Answer to Plant Modernization

Whiting's new Thrif-T Crane is slated to spark a trend in plant modernization. It's a husky crane. It has plenty of stamina to do big jobs with the speed demanded by today's production schedules and cost levels. *Yet, it costs much less than you'd expect!* Pre-engineering, mass-produced parts . . . and a host of exciting new design developments enable new Thrif-T Crane to provide big-crane performance at small-crane cost. *Whiting Corporation, 15601 Lathrop Avenue, Harvey, Illinois.*

87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

75th year

WHITING

CRANES

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY, RAILROAD, AND CHEMICAL PROCESSING EQUIPMENT.

TAKE THIS SHIRT-SLEEVE SHORT-CUT TO MORE EFFICIENT ASSEMBLY!

Are you open-minded about methods of permanent fastening? If so, it will pay you to call in your nearby Thomson Fastening Man. Ask him to look at your new-product sketches or old-product assembly lines. Chances are, he can tell on the spot whether you can speed production or cut costs with time-tested automatic positioning and fastening techniques. If not, he'll pass your problem, drawings or samples along to his home-office engineers who know when riveting beats stapling, welding, cementing and other permanent fastening methods.

Your Thomson Fastening Man sells by giving shirt-sleeve service. He's more interested in solving fastening problems than in selling rivets. So, use him freely as your direct contact with 75 years of fastening experience. Why not make a date with him soon? Write today to Dept. IA.

JTL

JUDSON L.

THOMSON

MFG. CO., WALTHAM 54, MASS.

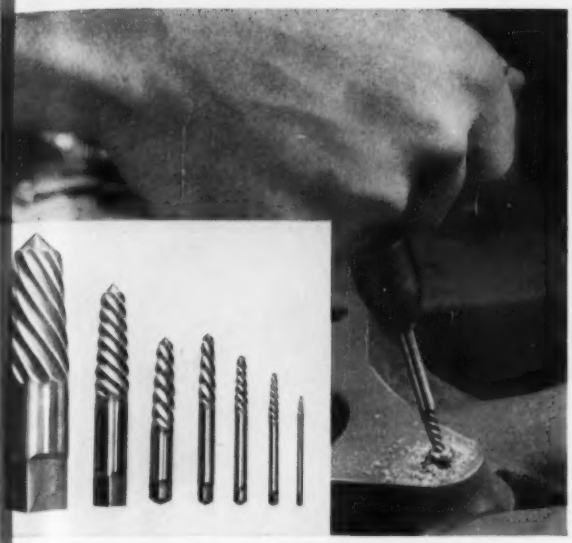
Used for Interior Parts of Fram Air Cleaners...

REPUBLIC TERNE PLATE ASSURES FILTER-FRESH AIR SUPPLY

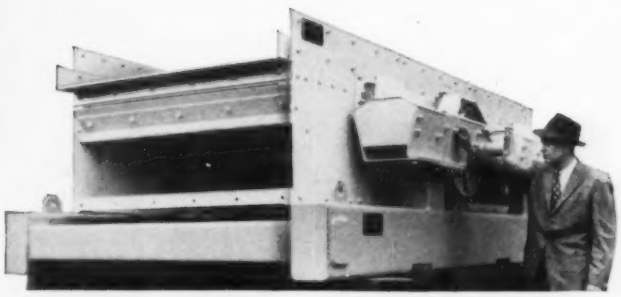
Efficient removal of airborne dust is the primary function of carburetor air cleaners manufactured by the Fram Corporation, Birmingham, Alabama. And, to make sure the cleaned air stays clean as it enters the carburetor, Fram uses Republic Terne Plate for vital interior parts. The tight, uniform, lead-tin coating on this material guards against formation of rust particles which might enter and block fine carburetor jets. As a result, a potential source of trouble in the carburetor system is eliminated.

Equally important, from Fram's standpoint, is the excellent workability of Republic Terne Plate. The parts for which it is used – inner primary plate, center tube, carburetor tube, and cover plate – require severe fabricating operations. The 2¾" diameter, 2¾" deep center tube, for example, is drawn from a 6¾" circular flat blank. The cover plate is "hemmed" around the perimeter to produce a double thickness. Republic Terne Plate withstands these and other punishing operations with no cracking or flaking of the coating or loss of its ability to fight corrosion. In addition, the coating requires no preparation to provide an excellent base for painting.

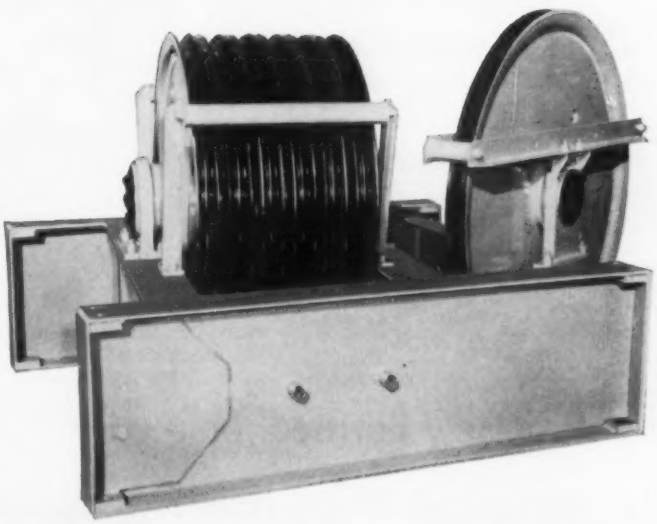
It will pay you to consider all of the advantages of Republic Terne Plate in relation to your own sheet steel product service and manufacturing requirements. For complete information, contact your nearest Republic office, or send coupon.



QUALITY AND ECONOMY ARE ASSURED in screw extractors made of Republic Cold Drawn Leaded Alloy Steel by the Henry L. Hanson Company, Worcester, Massachusetts. Beneficial characteristics of this versatile material include high machinability, formability, hardenability, and toughness. As a result, screw extractors can be produced faster and at less cost than was possible with former materials and, after scientific heat treatment, are practically unbreakable. Republic Cold Finished Alloy Steels are available in every standard analysis, plus many specials. Mail coupon for further information.



FINE-THREAD REPUBLIC CAP SCREWS of several different steel analyses are used for assembly of major components in Ty-Rock Vibrating Screens, built by the W. S. Tyler Co., Cleveland, Ohio. Use of these fasteners enables Tyler to distribute loads better and eliminate danger of fatigue failure due to vibration and cyclic loading. Republic produces more than 20,000 standard and 8,000 special types and sizes of fastener products to meet a wide variety of production and product requirements. Send coupon for details.



ASSURANCE OF STRENGTH WITHOUT EXCESS WEIGHT is a major reason why the Lee C. Moore Corporation, Tulsa, Oklahoma, uses Republic 4150 Hot Rolled Alloy Steel for shafting in cantilever mast crown blocks. Shafting must be able to absorb shocks and impact without failure while carrying massive weights of drill pipe. Location of the crown block in the top of the rig makes light weight vital. And yet operating safety is of paramount importance. Republic Alloy Steel meets all of these requirements and provides high abrasion and fatigue resistance as well. Republic Alloy Steels provide strength, safety, and economy in thousands of product applications throughout industry. For complete data, mail coupon.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. IA-6201R
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:

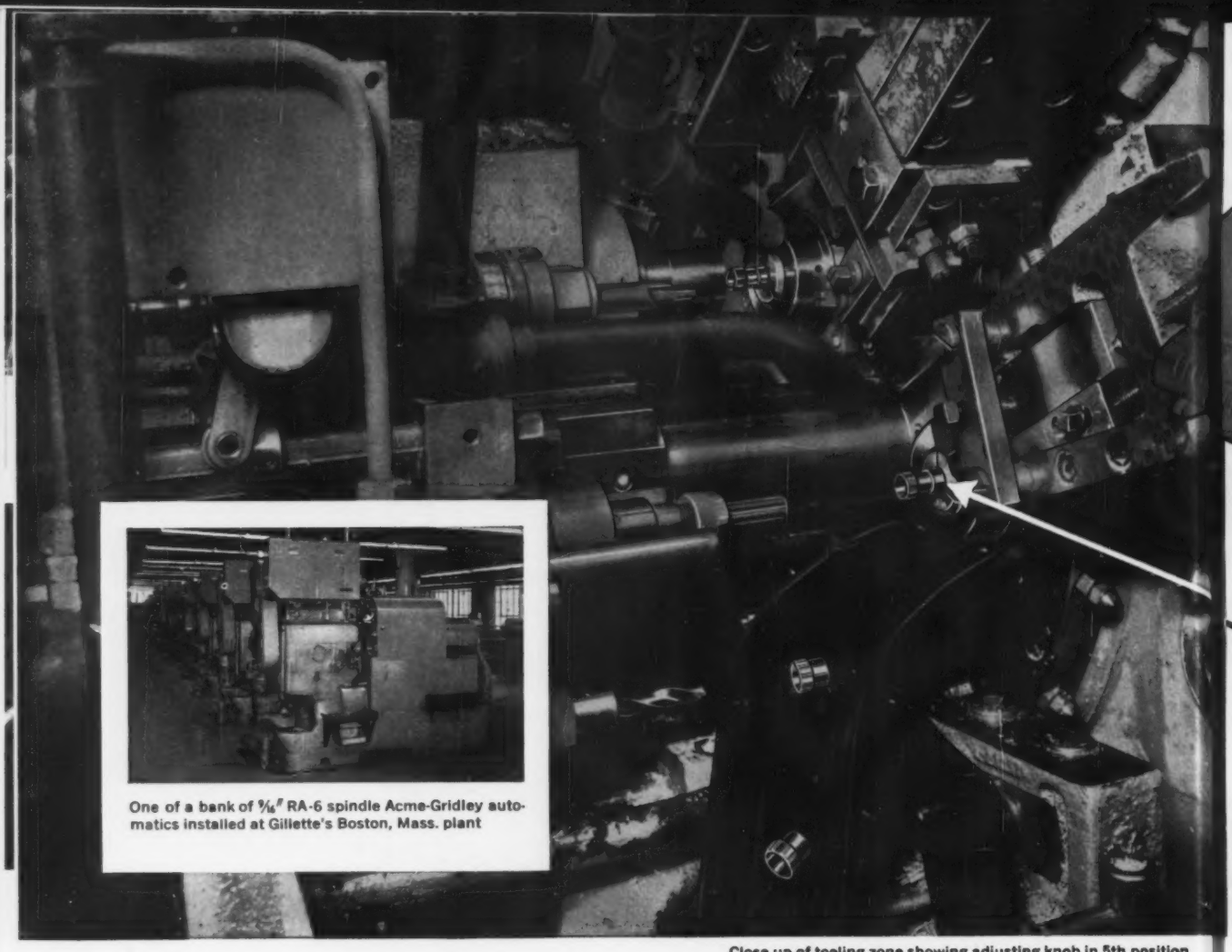
☐ Terne Plate ☐ Hot Rolled Alloy Steel
☐ Cold Finished Alloy Steel ☐ Fastener Products

Name_____ Title_____

Company _____

Address _____

City_____ Zone____ State_____



One of a bank of 7/16" RA-6 spindle Acme-Gridley automatics installed at Gillette's Boston, Mass. plant

Close up of tooling zone showing adjusting knob in 5th position

Precisely Formed, Marked, Knurled,

Broached, Micro-finished, Reamed and Tapped . . .

ON ONE ACME-GRIDLEY AUTOMATIC

in *4½ Seconds!*

The adjusting knob on this new adjustable razor is but one of its several precision components made by The Gillette Safety Razor Company on 5/16" Acme-Gridley six spindle bar automatics. The requirements were extremely exacting, *with as many operations as possible performed in the primary setup!*

For example: nine positions are stenciled on a turned portion of the O. D. with interrupted knurling held in exact peripheral location to the marking. In addition, close tolerance hole sizes are involved and *all* external burrs completely removed. All tools had to be synchronized to produce the exacting number-knurl relationship on the periphery.

Working in close cooperation with Gillette engineers, National Acme specialists took full advantage of the wide-open tooling zone, independently operated tool slides and the extreme accuracy and flexibility of direct camming . . . to perform an ingenious job of tooling. Many operations normally considered "secondary" were accomplished in the primary setup. Costly rehandling and "second machine investments" were reduced.

Write or ask one of our representatives for the complete story on the industry's most modern approach to *your* cost reduction problem.

Pioneer in
Circumferential
Automation

National Acme

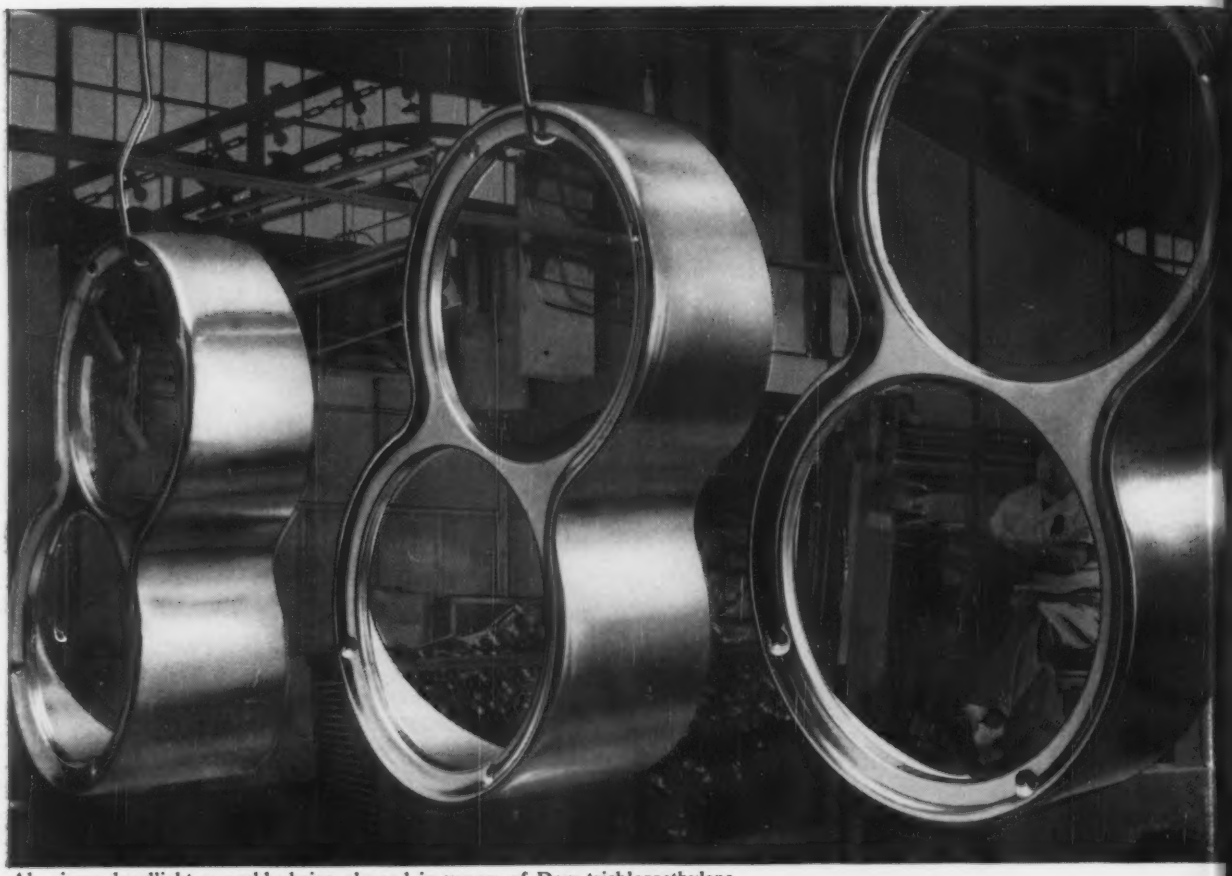
The National
Acme Company
175 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

DOW

metal cleaning report no. 1

case histories from your Dow Solvents Distributor



Aluminum headlight assembly being cleaned in vapors of Dow trichloroethylene.

DOW FIELD-LAB TEAM SOLVES DEGREASING RIDDLE

Bay City, Mich.—Manufacturer of auto parts reported faulty still was causing dirty distillate in his trichloroethylene degreasing operation. Dow field team went in, did thorough check of whole operation. Discovered not one, but three trouble spots: (1) Water separator on degreasing unit working improperly; (2) Excess water in stamping oil on parts being cleaned (Dow lab finding); (3) Faulty steam injection valve on still. Valve replaced, water separator repaired, and new stamping oil put in use. Plant now getting good cleaning action first time through vapor degreasing unit using Dow trichloroethylene. Key to solution was skill and thoroughness of trained Dow solvents team.

Time and time again, Dow solvents distributors help manufacturers improve cleaning and stripping operations. And for two good reasons: (1) Dow offers the widest line of chlorinated solvents for modern industry; (2) Dow backs its distributors to the hilt with technical information and on-the-job help. Chances are good that one of the many Dow industrial solvents can help smooth out your operations, too. Dow solvents are made to high purity standards and each is designed to do a specific job and do it well. For help on your metal cleaning problems, call on the nearby Dow solvents distributor.

THE DOW CHEMICAL COMPANY • MIDLAND, MICH.

NEW COLD CLEANER SAVES BIG DOLLAR

Detroit, Mich.—Expensive fluorinated cleaner was being used by manufacturer to remove paraffin oils from refrigeration compressors. Key requirement: clean parts without damaging insulation varnish on motor windings. Dow solvent team invited in. Observations pointed to Chlorothene® (Dow 1,1,1-trichloroethane, inhibited). Compressors cleaned with Chlorothene and air purged immediately after. Lab tests proved Chlorothene cleaned effectively, safely, without damaging insulating varnish. Company switched to Chlorothene, effected dollar savings while getting safe, sure cleaning.

PERCHLOROETHYLENE KEY

Los Angeles, California—Nationally known lock manufacturer was having difficulty cleaning plated metal parts. Door handles and face plates were coming off trichloroethylene degreasing line with marring water spots. Dow called in on problem. Recommended switch to Dow perchloroethylene. Higher boiling point and longer cleaning action resulted in spotless parts. Lock maker now saving time, money, with efficient perchloroethylene degreasing.

FREE . . .
TECHNICAL SERVICE
on 24-hour notice

Your Dow solvents distributor will gladly help you with any problems you're experiencing with metal cleaning solvents. He'll have a trained solvents specialist en route to your plant within 24 hours after your call is received!

Ask your Dow solvents distributor for details.

STOP-OFF LACQUER STRIPPED FAST

Stratford, Conn.—Major aircraft engine manufacturer was having trouble removing stop-off lacquer used on steel and aluminum parts selectively plated. Parts were being soaked and rinsed in flammable thinner. Process was slow, results unsatisfactory. Dow solvents distributor suggested vapor degreasing with Dow methylene chloride. Parts were run through vapors, then rinsed with spray lance application of m.c. System worked. Lacquer stripped off clean in matter of minutes. Flammability hazard eliminated. Problem marked solved.

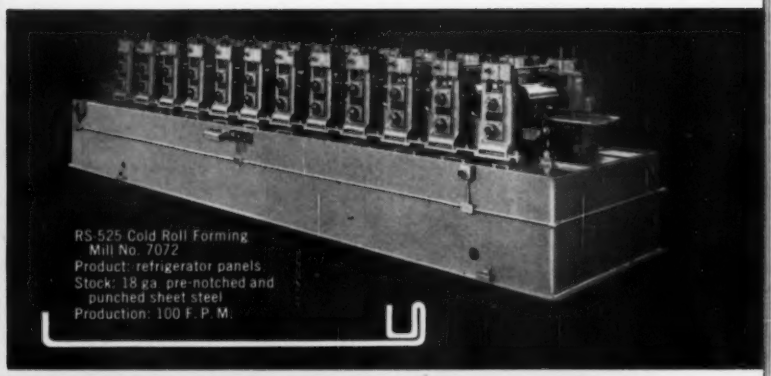
CHLOROTHENE®
TRICHLOROETHYLENE
PERCHLOROETHYLENE
METHYLENE CHLORIDE

See Your Dow Solvents Distributor First!

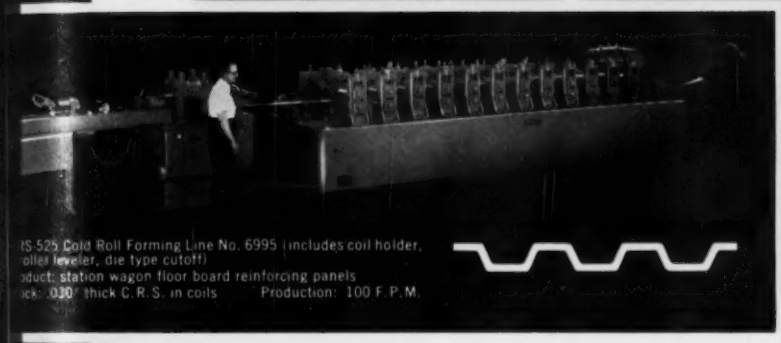
Roll forming - upswing.....

Recently installed in the plant of one of America's leading steel companies was this McKay cold roll forming line for the forming and cutting to length of industrial shelving angles up to .116" mild steel strip with pre-notched holes for joining. Line is composed of double rotating coil holder, roller leveler, pre-notching press, forming machine, cut-off, run-out and kick-off table.

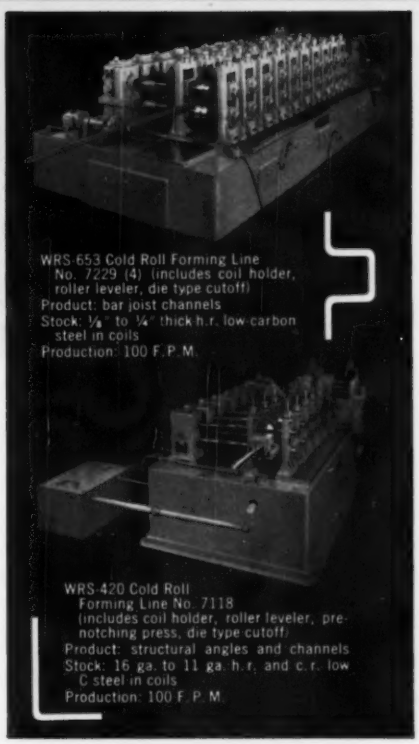
Completely Automatic Rim Rolling Line No. 6798
Product: automobile and farm implement drop center wheel rims
Stock: welded steel bands
Production: 600-900 Rims per hour



RS-525 Cold Roll Forming Mill No. 7072
Product: refrigerator panels
Stock: 18 ga. pre-notched and punched sheet steel
Production: 100 F.P.M.



RS-525 Cold Roll Forming Line No. 6995 (includes coil holder, roller leveler, die type cutoff)
Product: station wagon floor board reinforcing panels
Stock: .030" thick C.R.S. in coils Production: 100 F.P.M.



WRS-653 Cold Roll Forming Line No. 7229 (4) (includes coil holder, roller leveler, die type cutoff)
Product: bar joist channels
Stock: ⅛" to ¼" thick h.r. low-carbon steel in coils
Production: 100 F.P.M.

WRS-420 Cold Roll Forming Line No. 7118 (includes coil holder, roller leveler, pre-notching press, die type cutoff)
Product: structural angles and channels
Stock: 16 ga. to 11 ga. h.r. and c.r. low C steel in coils
Production: 100 F.P.M.

Manufacturers of all kinds of products look to McKay Machine for roll forming equipment to lower man-hour costs!

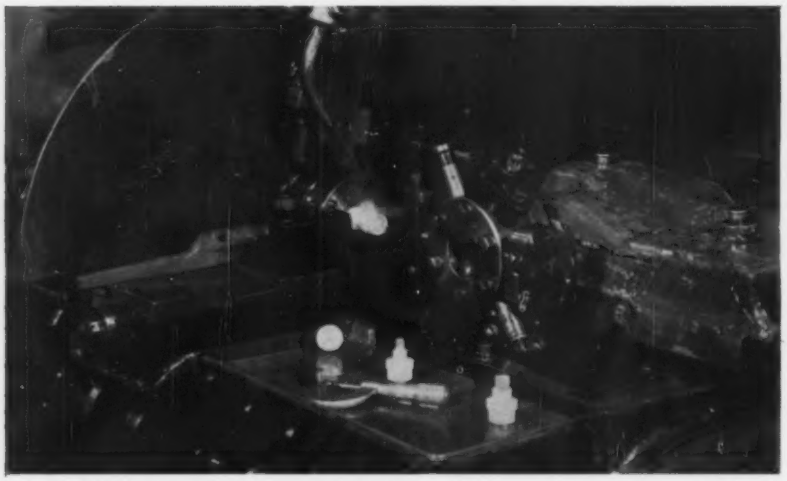
To increase man-hour production, manufacturers are turning to the automated roll forming line. In recent years McKay Machine engineers have developed equipment that enables fabricators to produce more and more products in a continuous stream directly from coiled stock.

From drop center wheel rims and station wagon floor boards to finished refrigerator parts, manufacturers are finding roll forming gives them greater production control and product uniformity while eliminating many costly intermediate manufacturing functions.

Analyze your production—there may be a way you can take advantage of roll forming economies. To help you, why not rely on the 20 years of roll forming leadership of the *McKay Machine Company, Youngstown, Ohio.*

McKAY MCK MACHINE

Lubrication



SPECIALLY TRAINED OPERATORS now machine "Teflon" to tolerances of .001" with Texaco Cleartex BX.

ANSWER TO "TEFLON" MACHINING PROBLEM FOUND BY THROWING OUT STANDARD CUTTING TECHNIQUES

DuPont's new thermoplastic, "Teflon" (or, more precisely, Polytetrafluoroethylene resin) has a combination of properties which makes it uniquely advantageous in a number of applications.

They also make it uniquely difficult to machine.

Unlike other thermoplastics, "Teflon" does not flow well in its melted state. This, plus the fact that the molding process requires extremely high temperatures, makes molding to close tolerances difficult. "Teflon" must be machined from rod stock when tolerance is a critical factor.

Special machining problems. Standard cutting techniques cannot be applied to "Teflon" machining, according to Mr. S. Mulay, President of Tri-Point Plastics, Inc., Albertson, N. Y. His firm, which specializes in working DuPont's new product, had to invent new cutting techniques and retrain operators to cope with "Teflon's" special characteristics. In spite of these steps, the materials–tools and lubricants–used in the machining process still gave Tri-Point trouble.

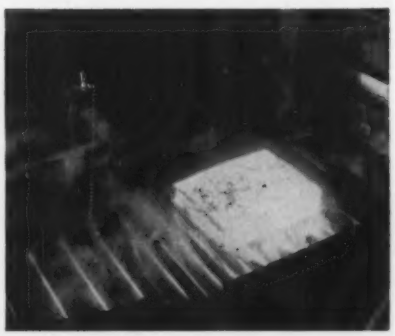
Cutting oil a critical factor. It soon became obvious that standard cutting oils used for ordinary metalworking were not adequate for "Teflon" machining. Although "Teflon" is not an abrasive material, its very low thermal conductivity coupled with its high heat resistance tended to shorten tool life by actually burning cutting edges. These high temperatures also warped the machined part, making close tolerances almost impossible. Finally, "Teflon's" white color made it extremely difficult to see the work through soluble oil emulsions–which otherwise might have solved the problem.

Tri-Point calls in Texaco. At this stage Tri-Point turned to the expert – a Texaco Lubrication Engineer. He outlined the need: a transparent cutting oil with the ability to remove the maximum amount of heat. After considerable study and testing, he recommended switching to Cleartex BX whose characteristics seemed precisely to fit the situation. His choice has proved to be right. Now Tri-Point uses this oil exclusively, with excellent results. Tool replacement has dropped significantly, and Tri-Point can count on maintaining "Teflon" tolerances of .001".

Pressure plus heat presents two-way lubrication problem

There is a definitely established trend today toward higher and higher temperatures in industrial processes in almost every type of industry. Mill rolls, plastic extruding machines and steam joints are only a few of the many applications which now involve temperatures well over 300° F. combined with high pressures. This combination has presented a severe lubrication problem – particularly in grease-lubricated equipment.

Nature of grease creates problem. As temperature rises, the consistency of grease decreases – most greases become virtually useless at temperatures above 350°. Furthermore, high heat will usually cause rapid oxidation and deterioration in a relatively short time.

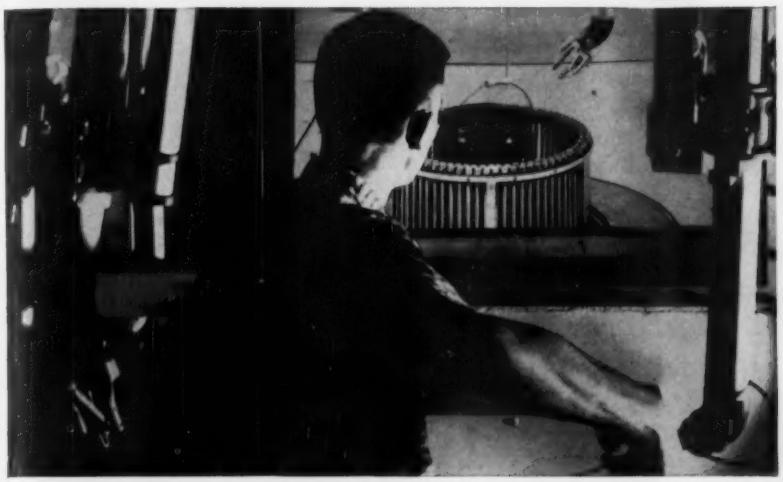


Unique new grease resists both forces. Texaco has now developed a new product whose remarkable performance in two years of field tests seems to answer the problems of *both* high heat *and* extreme pressure–Thermatex EP-1.

Thermatex is unique in its high resistance to both these forces.

Protects 400° equipment for two years. Thermatex has been field-tested for two years as the lubricant for steam joints in a paper mill. Previous products used had solidified and coked after two weeks of exposure to the extreme pressures and 400° F. heat, causing failure of the joint. Thermatex, on the other hand, has kept the steam joints operating without failures–and without significant wear–for two years.

news



GAMMA-RAY "HOT CELL" AT BEACON contains radioactive Cobalt-60.

Nuclear energy harnessed to crack the secret of better lubricants

Lubricants finer than the ones available from even the most advanced standard refining techniques will soon be produced by Texaco—with the help of nuclear radiation. Completely *new* lubricants are a real possibility, too—lubricants with atomic structures stronger and more cohesive than anything now available.

To open up this new frontier in lubrication, Texaco has assembled the most fully equipped nuclear laboratory in American industry. Texaco scientists have been put in command of all four basic irradiation forces—electrons, positive ions, gamma rays and neutrons—and are now probing the activity of hydrocarbon molecules during refining.

In addition to the Cobalt-60—rated at 29,000 curies—Texaco scientists have at their disposal a 6- to 10-million electron volt linear accelerator and a 3-million electron volt positive-ion Van de Graaff generator. The linear accelerator, or "electron gun," was especially designed and built for Texaco and is probably the only nuclear instrument of its kind now in use by a commercial firm for its own fundamental research.

Searching analysis of deposit problems

The January 1959 issue of *Lubrication Magazine* is entirely devoted to deposit problems—their causes, prevention and solutions. This article should be of vital concern to every engineer who has to cope with this often-costly lubrication problem. See coupon.

TUNE IN...Metropolitan Opera Radio Broadcasts Every Saturday Afternoon

★★ SEE! ★★

"HYDRAULICS"

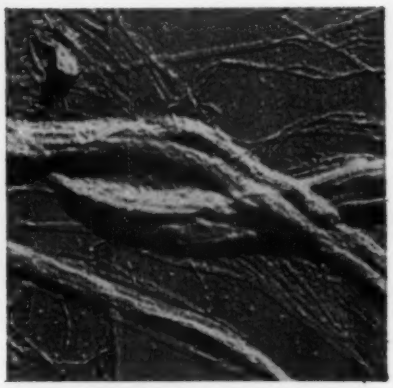
"One of the year's most informative movies!"

—Paul Rolnick, Editor, *Applied Hydraulics*

NEW PRODUCT NEWS

Nondrying protective coating keeps parts free from rust and corrosion for as long as a month during inter-process handling, storage, and shipment: *Texaco 564 Rustproof Oil.*

New, easy-to-apply gear lubricants won't drip in hot weather or flake off in cold—are ideal for many open-gear applications: *Texaco Geartac.*

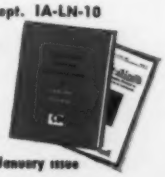


How working splits grease fibers.

80,000x electron microscope explores grease structures

One of the most important tools of research, the electron microscope, is helping in the development of new and better greases. By understanding the nature of grease structures and their reaction to various conditions, Texaco scientists can create greases that are suitable for many different purposes.

THE TEXAS COMPANY, Dept. IA-LN-10
135 East 42nd Street
New York 17, New York



Dear Sirs:

☐ I am interested in seeing "HYDRAULICS"

I would like a free copy of

☐ Lubrication Magazine — January issue

☐ Management Practices that Control Costs via Organized Lubrication

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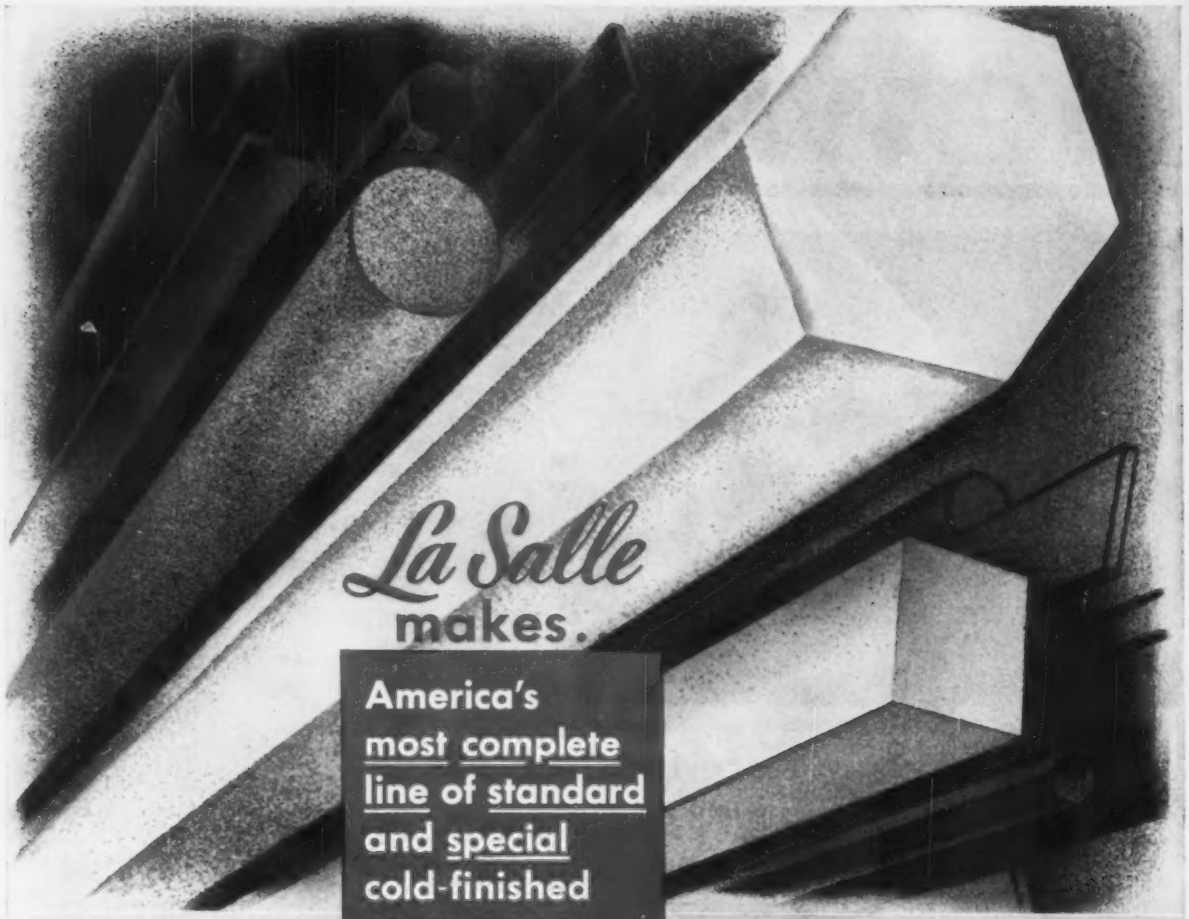

La Salle makes.

America's most complete line of standard and special cold-finished STEEL BARS

Rounds . . flats . . extra wide flats . . squares . . hexes. Always available in a full range of popular standard sizes and lengths.

Cold-drawn . . turned and polished . . ground and polished. Exceptional size accuracy, straightness, concentricity, and uniformity. Produced to standard or special tolerances.

Carbon and alloy steels. La Salle produces a broad line of high quality cold-finished steel bars in AISI and SAE carbon and alloy grades.

Screw machine steels. For improved machinability and increased production, La Salle offers the finest lead treated or resulphurized steel bars.

Furnace treated steels. Careful furnace treatment develops required physical properties through quenching and tempering. Annealing improves machinability.

—AND THESE EXCLUSIVE SPECIALTY STEEL BARS:

FATIGUE-PROOF® . . produced by "e.t.d."® (Elevated Temperature Drawing) process. Guaranteed 140,000 psi minimum tensile. Fast machining. No heat treating necessary.

STRESSPROOF® with copper . . contains copper for improved machinability and other properties. Guaranteed yield, 100,000 psi in all sizes.

LA-LED® . . a lead bearing, fast machining steel. Machines twice as fast as B-1112 . . 45% faster than B-1113. Excellent ductility . . sounder cross section. Permits better carburizing.

Super LA-LED® . . fastest machining steel ever commercially developed. Ideal for parts which previously could be machined economically only from brass. Excellent ductility and carburizing qualities.

Ask for any or all of these reference materials on La Salle cold-finished steel bars

La Salle STEEL CO.

1436 150TH STREET
HAMMOND, INDIANA

Please send the following literature:

- ☐ *How to make your own machine and repair parts quicker and easier*
- ☐ *Wall chart listing 241 AISI grades of cold-finished steel bars*
- ☐ *La Salle Leaded Steels*
- ☐ *A new material . . (the story of FATIGUE-PROOF steel bars)*
- ☐ *Today's Improved La Salle STRESSPROOF steel bars*

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UNITED®

160" MILL FOR ROLLING ALUMINUM PLATE

UNITED ENGINEERING AND FOUNDRY COMPANY
PITTSBURGH, PENNSYLVANIA

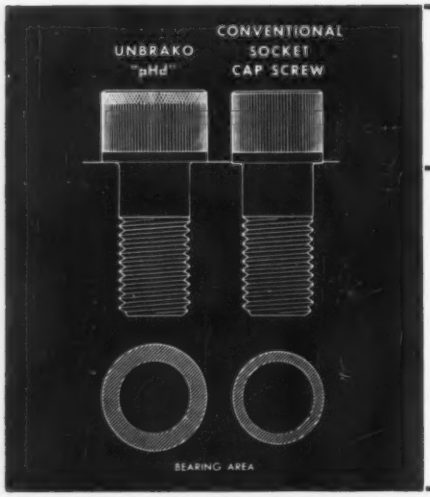
Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio; Stedman Foundry and Machine Co., Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

SPS RELIABILITY / *A dynamic standard of predictable performance*

Larger head diameter of UNBRAKO pHd* socket cap screws increases load-carrying capacity up to 233%



COMPARISON OF UNBRAKO pHd AND CONVENTIONAL DESIGN

Each size can now be utilized with equal reliability. The bearing stress is consistent from size to size in the new UNBRAKO pHd socket cap screws.

SCREW SIZE	HEAD DIAMETER (in.)		BEARING AREA (sq. in.)		LOAD TO INDENT IN CAST IRON (lb.)		% INCREASE USABLE STRENGTH	TIGHTENING TORQUE (lb.-in.)‡	
	Old	pHd	Old	pHd	Old	pHd		Old	pHd
¼	.375	.375	.041	.041	3,280	3,280	—	165	180
5/16	.438	.468	.047	.072	3,760	5,760	54	325	360
3/8	.562	.562	.102	.102	8,150	8,150	—	600	660
7/16	.625	.656	.116	.148	9,270	11,800	27	1,000	1,040
½	.750	.750	.188	.188	15,000	15,000	—	1,450	1,590
9/16	.875	.937	.203	.305	16,200	24,400	51	2,900	3,190
¾	1.000	1.125	.223	.432	17,800	34,600	94	5,050	5,600
⅞	1.125	1.312	.254	.594	20,300	47,500	134	8,000	8,900
1	1.312	1.500	.364	.785	29,100	62,800	116	10,550	13,600

*Proper Head Design—a factor in higher product reliability.

‡Normal recommended seating torques for unplated screws, fine threads.

For you, pHd means sounder fastening, with resultant increases in product reliability at no increase in price. With pHd UNBRAKO socket cap screws you get stronger, more reliable joints; space and weight saving through use of smaller or fewer fasteners; greater fatigue resistance through application of consistently higher preloads; fewer fasteners working loose under vibration or shock; and elimination of washers under cap screw heads in many applications.

The principal reasons for the superior performance of broad-bearing pHd UNBRAKO socket cap screws are up to 233% more load-carrying capacity than with a conventional cap screw and the ability to be tightened tighter. Because of increased bearing area, the vital preload that keeps screws tight and prevents fatigue failures is distributed over more of the bolted material. Indentation under high working load is eliminated. And pHd UNBRAKO screws have been designed for high tightening. In many cases the socket has been enlarged for better key engagement. Combined with this feature is the fact that all the tightening force is used to preload the screw, in contrast with the conventional cap screw—where indentation saps some or all of the tightening force.

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Old concepts of precision finishing, like the steam locomotive, are fading fast from the production scene. New ideas are replacing the old, as exemplified by Techline's total precision finishing service.

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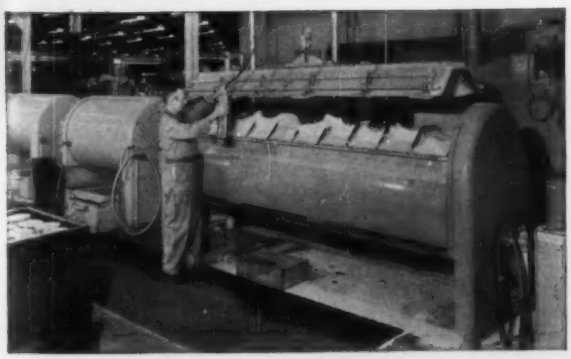
A leading aircraft and missiles parts manufacturer (below) uses Techline barrel equipment for finishing to .0001" tolerances. A Techline-Liquamatte cabinet (top) wet-blasts marine diesel engine cylinder liners prior to chrome plating.



If you want a lower-cost method of obtaining the precise finishing results you need, call on Techline — where precision finishing is a science.

Techline shatters an industry's traditions — makes precision finishing a science.

"You asked for it" — Techline built it

You-asked-for-them features are evident in the design of all Techline equipment. Model 30, for example, is typical of Techline standard barrel finishing machines. It comes in 20 sizes having 1 to 6 compartments, from 5 to 30 cu. ft. capacity.

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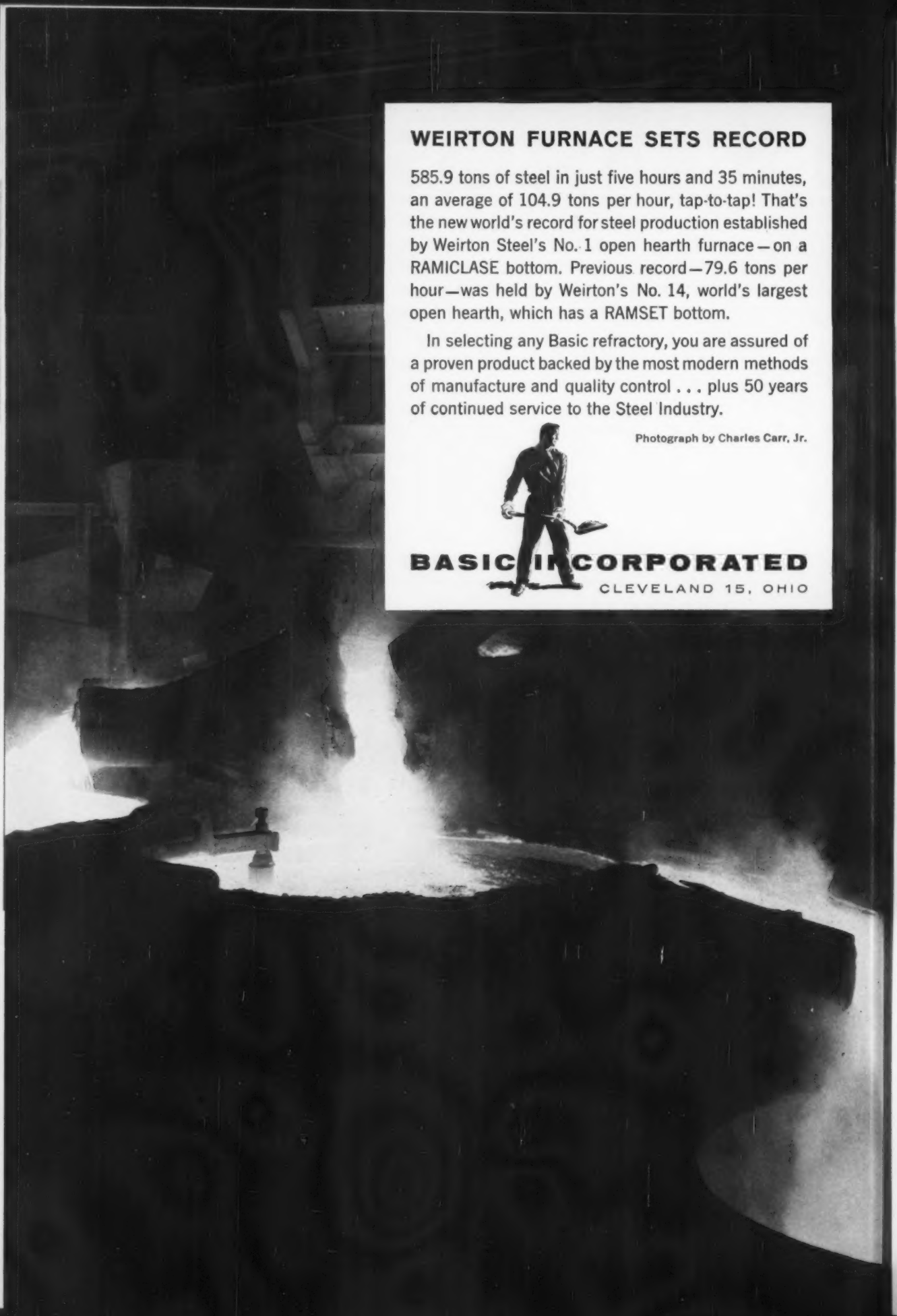

WEIRTON FURNACE SETS RECORD

585.9 tons of steel in just five hours and 35 minutes, an average of 104.9 tons per hour, tap-to-tap! That's the new world's record for steel production established by Weirton Steel's No. 1 open hearth furnace—on a RAMICLASE bottom. Previous record—79.6 tons per hour—was held by Weirton's No. 14, world's largest open hearth, which has a RAMSET bottom.

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Photograph by Charles Carr, Jr.

BASIC INCORPORATED

CLEVELAND 15, OHIO

PORCELAIN ENAMEL INDUSTRY has a new ally in its fight to recapture lost markets. A new enameling iron may enable porcelain enamel to compete pricewise with painted metal. Productis still experimental.

STAINLESS STEEL will crack the vehicle bumper market in 1960. One truck builder has already decided to use a bumper made of stainless-clad steel. Cost hasn't been determined, but is expected to be close to that of plated bumpers.

LOOK FOR SOME AUTOMAKERS TO TRIM OUTPUT in March, but for total production to remain the same or even rise. Automotive News, the industry trade paper, reports new car stocks were close to 650,000 units on Feb. 1, up 100,000 over Jan. 1. But some cars are still in short supply.

BUSINESSMEN NOW CAN GET NEW CLUES to the nation's economic health. American Trucking Assn. is compiling a weekly report of intercity truck loadings from more than 400 major terminals. Truckloading of general freight have been found to relate closely to over-all business conditions.

STEEL MILL CAPITAL SPENDING PLANS could jam equipment shops within three months, according to one equipment maker. This comment comes in the wake of National Steel's decision to build a mill in the Chicago area. U. S. Steel alone is said to have a program twice the size of National's. Another near-certainty involves hot and cold strip mills for Ford Motor Co.

DETROIT'S DECISION to enter the small-car field may not be the bonanza equipment makers had looked forward to. The carbuilders probably will be able to make do with equipment they aleady have. Besides, profit margins on small cars will be less than on traditional U. S. makes.

INDUSTRIAL OUTPUT IS STILL CLIMBING. Federal Reserve Board says its industrial production index rose one point in January to 143 pct of the 1947-49 average. This was less than 2 pct below the pre-recession level of August 1957. Durable goods output was 5 pct lower than in August 1957.

PRESSURE ON STEEL PRICE 'EXTRAS' is mounting. Mills complain they're not getting enough for the extra processing and service ordered by most steel users. They point out that extra charges have been a diminishing percentage of total steel costs. Steel extras tend to get out of line after several base price rises, and must be adjusted.

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for Every Industry

This new profit improvement program from American Screw Company offers a significant departure from the usual consideration of fasteners:

it will show you how fastening techniques can be applied directly to the improvement of your company's profit.

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a. we will show what quality in standard fasteners has already meant to manufacturers like yourself. One company last year had a $300,000 order rejected solely because of poor fasteners.* It cost nearly $100,000 to correct the fault. That came out of profit.

b. we will point out the factors of selecting standard fasteners that *can* make a significant difference in your costs and profits . . . regardless of how much you pay for the fasteners.

c. we will talk about products that may cost more to buy but will cut your assembly and labor costs so drastically they result in considerable profit to you.

You will find these aspects — and others — of the Profit Improvement Program being brought to your attention regularly by American Screw Company salesmen and distributors, by messages appearing in these pages, by printed literature mailed to you.

They will talk products, new developments, new ideas, new applications. They will make sense because they will make profits for you.

*Not ours, thank heaven!

Profit Improvement Program

1000-pound Torque-Tester, designed by American Screw Company research department, measures both driving and breaking torque of threaded fasteners. This is one of many unique types of equipment developed by American Screw Company to produce fasteners that contribute to your profit improvement. These research facilities are available on a "no-charge" basis to help you with your special fastener requirements.

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New Product May Help Porcelain Regain Lost Markets

Armco's new enameling iron may make porcelain competitive with painted products.

One-coat enameling job holds up in corrosion and chipping tests.—By T. M. Rohan.

▪ An old steel product with a new twist is finding the welcome mat out in the appliance industry.

Enameling iron, one of the oldest and most versatile sheet products, has had a few changes which are helping builders of washers, refrigerators and ranges make a better product for less money. With it, builders of these machines can apply a full coat of porcelain in one firing rather than the present two coats. Resistance to rust is improved and chipping is even less than with conventional two coats.

Old Product, New Dress—The enameling iron in a new dress is "Univit," being turned out in experimental quantities on a pilot line of its developer, Armco Steel Co. at Middletown, O. It carries a modest premium of $1 per cwt base over regular enameling iron, and comparable extras. By a secret rimming and annealing process, the steel is made porous and thus free from gas - producing tendencies which can cause blistering of porcelain. Carbon and magnesium content is also very low.

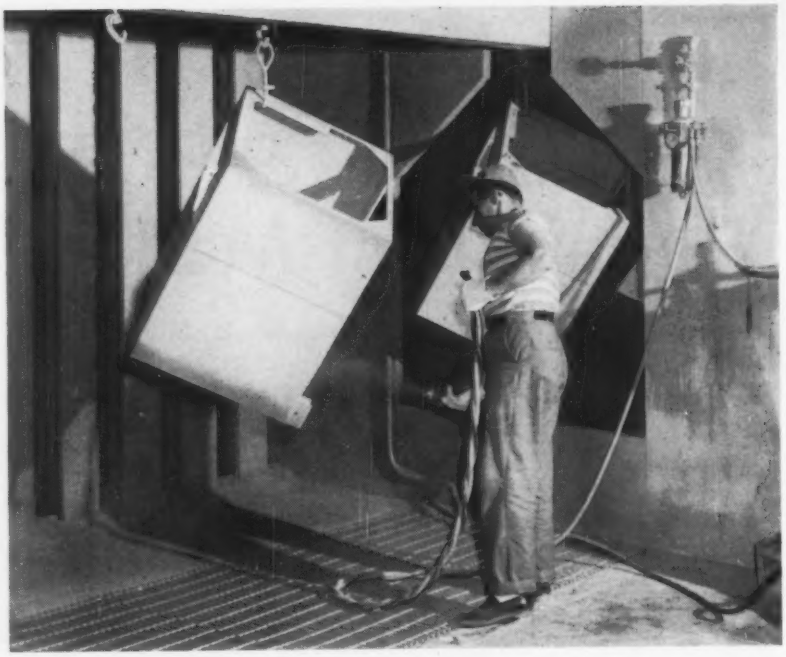
Inland Steel Co. has also made a titanium-treated one-coat enameling sheet called Ti-Namel since the late 40's. Although premium-priced at $10.525 per cwt, it is very popular and capacity is being increased. Westinghouse has geared substantial production to it since 1948. Youngstown Sheet & Tube Co. reports many customers experimenting with one coat on cold-rolled sheet but that no one-coat is being promoted as such.

Who's Using It—First major user of Univit is RCA Whirlpool at Clyde, O. which started exhaustive tests at the bottom of the recession and now is using it as standard on a 21 in. ring in its own and Kenmore washers. General Electric and Westinghouse are also using it on appliances. Armco emphasizes, however, that the product is still experimental, in pilot production in limited quantities and mostly out for evaluation. Like most other sheet products these days, all tonnage is spoken for.

For Whirlpool, single-coating of the whole body of washing machines and dryers would enable it to meet a long-sought goal of competing pricewise with lower-cost painted appliances without sacrificing quality.

Research on Cold-Rolled — Research is also continuing on working out a single-coating system for cold rolled steel at Whirlpool but no production use has been made of it. Because of the limited pilot

PILOT LINE: Armco's new one-coat one-fire enameling iron is produced on this pilot line at Middletown, O., plant. Product is experimental.



COMPETITION: Spray-painting of appliances has been a competitive thorn in the side of porcelain enamelers. But progress toward development of an economic one-coat one-fire enameling steel offers promise of enabling enamelers to compete on basis of price and superior quality.

production of Univit, there is not enough available to make whole appliances out of it in the quantities turned out at Clyde which is one of the largest plants of its type. Also producers are reluctant to tie themselves to a single source of supply.

In production of the rings at Whirlpool Corp., the single coat rather than two previous coats makes it possible to enamel almost twice as many of the rings in the same time, thus cutting the cost. Although the theoretical gain is 100 pct, it comes out actually to about an 80 pct increase. Conversely production can be almost doubled with existing firing facilities.

A Severe Test—About 100 machines made entirely of Univit were put in homes in the highly-humid New Orleans area to test rust resistance. After about a year's service they were shipped back to the plant and taken apart for inspection. There was no significant rust, which is a problem on regular two-coat types. Univit washers were also tested for chipping by sliding crated units down an incline into a brick wall. They passed these and other National Safe Transit tests of the Porcelain Enamel Institute with flying colors.

The new single-coat Univit is significant because it marks the reentry in a new role of enameling iron to the porcelain coated appliance industry where it used to be almost the exclusive raw material. Before World War II it was practically standard for stoves, sinks, washers, ironers and similar appliances. It was relatively soft, easily drawn, and had good corrosion resistance.

Why It Lost Ground—Following World War II it lost ground to lower-priced cold-rolled sheets in most of these applications. Its cost remained higher than cold-rolled because mills had more trouble turning it out. Yields are less, rolling has to be done cold because if it is too hot it will "blow up" and it requires both annealing and normalizing.

One of its major uses have been in heavier gauge items like bathtubs, curtain wall construction partitions and electric light reflectors. But Univit could start it back to a big-tonnage item.

Base price of the Univit is $7.77 per cwt or about $1 higher per cwt than conventional enameling iron at $6.775. Conventional cold-rolled is $6.275 per cwt in most areas. Whirlpool is using it in 19 ga. thickness and the mill range is 16 through 24 ga. with sizes up to 50 in. wide and 145 in. long.

Solves Gas Problem—The higher porosity of Univit is favorable for porcelain coating because it does not trap gas which can form blisters later on. In conventional porcelain coating, firing is done at about 1500°F, to some extent to free trapped gas and smooth out the coat. Double firing makes it even more efficient. Univit must be fired at 20 to 30° higher to help smooth out the coat and minimize "orange peel."

Otherwise only minor changes in conventional fabricating and porcelain enameling practice are necessary. Because of the single thin coat, burrs and scratches must be watched where normally they would be covered in two-coat practice.

Good Drawing Quality—Drawing quality is similar to conventional enameling iron but occasionally roller levelling may be necessary on aged material or where hot dry soap lubricant is used. Roller seam and spot welding are recommended. Metal finishing should precede pickling and nickel flashing for best bond.

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National Plans Chicago Mill

New Plant Will Produce Sheet Products

National Steel is first producer to complete plans for new mill in Chicago area.

Move may have been timed to get head start on others also planning mills in the near future. —By G. J. McManus.

■ In a move that could start a chain reaction, National Steel Corp. has announced plans to build a new steel plant in the Chicago area.

The plant will be situated on a 750-acre site on Lake Michigan in Porter County, Ind., between Gary and Michigan City.

Finishing Only—Part of a $300 million program, the new works will initially have only finishing facilities. It will make tinplate, galvanized sheet, hot and cold rolled sheets. Hot rolled coils for these products will be supplied by Great Lakes Steel Corp., a National division, at the rate of 840,000 tons a year.

To meet the new mill's needs, Great Lakes will add 500,000 tons of ingot capacity by enlarging existing openhearth furnaces and installing oxygen lances. An 80-in. hot strip mill will also be added.

Others Interested—The big question: Will National's move into Chicago bring similar action by others? There is no doubt that many major mills would like to move in. Chicago is the largest metropolitan metalworking center in the country, turning out something like $10 billion in metal products a year. (See box.)

According to one equipment maker, National Steel's Chicago move was timed to get the project started before other contemplated Chicago programs were decided and before a general wave of steel mill capital spending began. At least two other mills have been actively considering entry into the Chicago district, says this source.

Throughout the steel industry the volume of work due to break will jam equipment shops within three months. A program of United States Steel is called twice the size of National's. Another called almost certain to materialize involves hot strip and cold strip mills for Ford Motor Co.

Still another leading candidate for new Chicago production is Bethlehem Steel, which owns land near the National site and has openly stated it wants in.

Sales Ballast—The new National plant will be known as Midwest Steel Corp. It will be headed by Albert J. Berdis, who will continue as president of National's Weirton Steel Division. Mr. Berdis was in charge of the Fairless Works during its construction by U. S. Steel.

The move will put National in the Chicago market with a full line of general flat-rolled products. In the past the mill has had to ship tinplate and galvanized steel west from Weirton, selling at a cost and service disadvantage.

For Great Lakes Steel, the new plant will provide an outlet away from the automotive field. With greater diversity the mill hopes to get away from the extreme slumps that have resulted from low periods in auto production. Great Lakes Chairman Paul Carnahan points out the mill operated at only 42 pct of capacity during the first three quarters of 1958.

Why a New Mill in Chicago?

The Chicago area is the nation's top metalworking market. Here's why:

Heavy Consumer: It is the center of a five state region which uses 50 pct of the steel in the U. S. About half of Chicago's industry is metalworking.

Despite the recession, its production of iron and steel forgings, castings, and nonferrous metals last year was valued at $2.8 billion. Fabricated metal products produced in '58 amounted to $1.7 billion. Electrical machinery accounted for another $1.7 billion. At least $1 billion worth of transportation equipment was manufactured.

Oil, Chemical Center: Petroleum production and coal chemical output in the area last year was valued at $1 billion. Both industries are strong consumers of steel products.

Transportation Hub: Chicago is the nation's largest truck and rail traffic terminal. And the biggest air freight terminal in terms of tonnage handled. When the St. Lawrence Seaway is opened this year, Chicago should become a major inland seaport. It expects to handle exports from 14 states with a total potential value of $18 billion.

Words to Avoid in Your Union Contract

Contract time is coming. Management negotiators can save a lot of future headaches by steering clear of "clinker" clauses. Here is some of the more troublesome language—and improved wording — as suggested by I. A. Delloff of Presto Lock Co.:

1. Don't settle for a clause giving you the "right" to maintain efficiency. Spell out efficient performance.

Example: "It is agreed that after a training period of 112 hours an employee shall reach 90 pct of the standard set for the job and, if failing, shall be laid off."

2. Don't allow vague clauses covering new methods, such as "only the element changed shall be recalculated." You may change several work elements in a new standard.

Better: "Standards of production will not be changed unless there is a change in methods, materials, equipment, feeds, speeds, quality requirements, or other conditions. Only the element changed, and other affected elements, will be recalculated."

3. Don't pay "average of incentive" for work you didn't get when a machine operator was waiting for materials or repairs to his machine.

Better: "All work done on jobs which are experimental, or do not yet have a standard, or are performed under conditions different from those under which the original standard was set, shall be paid at the base rate only."

4. Don't negotiate production rates. Best method is for management to set standards, with the union retaining the right to question them or to submit a grievance.

What Makes Arbitrators Tick?

Knowing how an arbitrator thinks can be a big help in presenting a case for arbitration. It can mean the difference between winning and losing.

After studying 1000 arbitration cases, Dr. Lawrence Stessin reported to the American Management Assn. personnel conference in Chicago that arbitrators, as a group, reason along similar lines. Their decisions follow a pattern.

Right-to-Manage—Because most union contracts are vague on discipline, it is in this area that many grievances occur, says Dr. Stessin.

In discipline cases, a manager must prove that his disciplinary measures are logical, clearly thought out, and aimed only at operating his plant at its best rate. In the eyes of the arbitrator, says Dr. Stessin, management hasn't lost its right to manage.

Boss Is Boss—Here's what you can expect from your arbitrator, as indicated by the pattern in these 1000 cases.

He'll accept the idea that the boss is still the boss. If an employee balks at an order, or questions management's right to issue the order, that worker is at fault as far as the arbitrator is concerned.

If the worker feels obeying an order would endanger his health or safety, he must obey the order and then submit a grievance, to win arbitrator backing.

No Sanction on Shoving—Any proven attempt to destroy managements' status puts most arbitrators on managements' side. For instance, a union reported that one of its members had given his plant foreman a "gentle shove." The union demanded arbitration when the company fired the worker. He stayed fired, and the arbitrator found that, whether it was a shove or a haymaker, the worker was out of order.

The worker who swore to "get his foreman when he's off the job" lost his job when he clouted the foreman at a racetrack. Since the argument originated in the plant, the arbitrator found for the employer.

Absentee Firings — The worker who is laid off for excessive absenteeism will find the burden of proof lies with himself and with his union, in the eyes of the arbitrator.

There are many findings against management in absenteeism cases. But these arise where management allowed considerable absenteeism before taking disciplinary measures, then clamped down, hard and suddenly, with the idea of "making an example" of one worker or a small group of workers.

Claiming Incompetence—On incompetency firings management must prove (1) that good work standards exist, (2) that the employee has been given warning that he is not doing his job, (3) the worker was given time to meet new, tighter standards, (4) that this firing is not a sudden crackdown, but a regular disciplinary practice.

What's Ahead for Zinc-Lead?

U. S. Will Stand Off Pressure to Drop Import Quotas

The U. S. delegation to the U.N. conference will be prepared to listen.

Here's why they probably won't hear enough to convince them to change our import quotas.—By F. J. Starin.

▪ The U. S. delegation will go to the U. N. conference on world lead-zinc markets to listen. They'll hear plenty — from other delegations and U. S. industry observers.

But when the conference breaks up—it's set now for the last week in April—the quotas on imports of lead and zinc into the U. S. will be basically intact.

Most likely:

Some countries that do not have specific quotas will be given part of what is now for "all other countries."

And the delegates will probably set up the machinery to extract better world statistics.

Nothing will be done because foreign countries and U. S. miners fear the likely alternatives.

The State Dept. says the current quotas can not be adjusted. The only change could be a switch of the period on which the quotas are based. This might favor some big sellers, but it would hurt others, so there is no organized position.

If Others Act—The U. S. has said it would be glad to rescind quotas if producing countries set up voluntary export controls that prove effective over a period of time. Most countries feel this would be more restrictive.

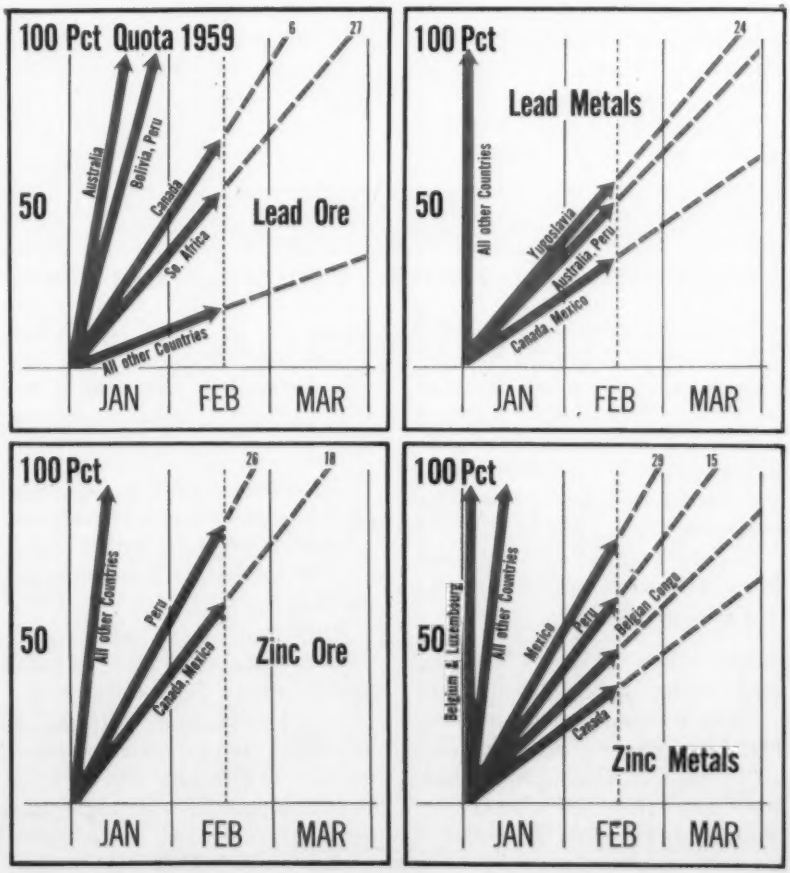
Also, some complaints amount to little more than a statement of position. For instance, in one quota country there are only a few producers of lead and zinc metal and ore. Reliable sources say within 48 hours after quotas were published these producers met to decide how they would share the quotas.

Almost all U. S. miners would prefer higher tariffs, but they are walking softly because they say quotas are better than nothing.

All is Fair—The U. S. government contends most of the inequities are more apparent than real. It concedes material under bond in the U. S. waiting to officially enter is large and growing. This means when the customs office opens on the first day of a quota period the initial requests to enter from some countries more than match their quotas. So each request is partially accepted, and material builds up for the next three months.

Stacked Up—Metal is in Class 4 warehouses, actually under customs lock and key. But ore is in Class 7 warehouses. This means it can be processed and even mingled with ore from other sources. But a bond is posted guaranteeing the metal won't be sold until it is officially admitted and the tariff paid. If a smelter overextends on ore from one source it is stuck with a pile of metal it can't move.

How Imports Match Quotas



Surge Coming in Steel Imports

Service Centers Face Foreign Mill Depot Competition

Import shops are springing up like mushrooms in the Midwest and Southwest.

Lower shipping costs, tariff readjustment are attracting importers.—By K. W. Bennett.

▪ "If any steel distributor in the state of Texas isn't stocking foreign steel, he's in trouble." The quote, from a veteran steel seller, indicates the growing alarm of steel service centers over the expected 1959 influx of foreign steel.

The battle will range down the West coast, through the Southwest, up the East Coast, and down the St. Lawrence seaway.

Japanese shippers, using the waterway, will be able to deliver steel to the Midwest more cheaply than they could barge it from New Orleans to Chicago. And the steel service centers, more than 2000 of them marketing nearly 20 pct of U. S. domestic steel output, are expected to be in the thick of the fight.

Import Shops Mushrooming—At Chicago, about 20 new distributors of foreign steel are opening their doors. One source reports 30 new import shops have opened in the Houston area in the past 30 days.

A first-line steel service center at Chicago was offered 50,000 tons recently. Port of Chicago cleared only 37,500 tons of foreign steel in its best year, 1953, and last year less than 15,000 tons came through Chicago customs.

Exports Up, But — Viewed at long range, the picture wouldn't seem dark. U. S. imports of foreign steel advanced at an average annual gain of 112,000 tons per year over the past decade. Steel exports rose an average 140,000 tons per year in the same period. In 1957 the U. S. imported 1,153,702 tons; exported 5,176,289—an all time record.

But here's why steel service centers, and even their mill suppliers, are uneasy:

Shipping Costs Are Falling—With the St. Lawrence seaway poking a finger into the key Great Lakes marketing area, U. S. shippers are racing for subsidies covering routes from Europe, the Mediterranean, and the Caribbean.

One shipping Conference serving the European-Great Lakes run has already cut prices per cargo ton from $27 to $18 per ton. Outsiders are undercutting the Conference with a $15 per ton price.

Secondly, a change of classification of European oil country goods and linepipe to a structural item has reduced U. S. import duties.

Depots Established—Third problem: Foreign steel has largely been sold from the boat, in the past. Importers are now preparing to warehouse material in mill depots in U. S. port areas. Previously, the material was sold by brokers or mill representatives on an average six week delivery time.

Mill depots will allow 24-hour delivery, in the U. S., and a reserve to cover winter months.

Slow Reaction — What's being done? At the moment, almost nothing.

U. S. Tariff Commission is doing a study of import wire and nails. A number of steel service centers are gathering statistics in an attempt to gage the danger. A handful are demanding their mill suppliers provide an answer.

One service center president summed it up. "We see a jump in foreign competition in 1959, as early as April. They'll have more distributors and access to our lake ports in big vessels. But we don't see an explosion."

Stainless: A Growing Service Center Item

Larger Share of Market — Steel service centers continued to grow in importance as outlets for stainless steel in 1958. Despite a decline in both mill and service center shipments from 1957, service centers' share of the market rose from 33.3 pct to 34.8 pct.

In tons, total stainless shipments in 1958 were 493,492 against 619,755 the year before.

The Whole Picture — Actually, total service center shipments in 1958 were about 10 pct higher than the American Iron and Steel Institute figure of 171,556 tons, which was derived from mill shipment figures.

Like steel users generally, service centers last year reduced inventories and themselves shipped more than they received.

Big Sellers Gain—In important product groups, steel service centers accounted for considerably more than its average 34.8 pct share of the market.

Warehouse CF bar sales totaled 24,846 tons, or 57.5 pct of total mill shipments. Sheet sales of 80,523 tons represented 56.5 pct of all sheet business. Plate orders, totalling 14,509 tons, was 52.3 pct of mill shipments.

AGAIN

P-K Internal-Fin Coolers can be furnished insulated with Rock Cork laid in asphalt and covered with a heavy steel jacket. Illustration shows insulated cooler.

Revere helps fit the metal to the job

AND PATTERSON-KELLEY CUSTOMERS SAVE 3 WAYS

Because of its unique design, the Patterson-Kelley Freon Water Cooler shown at right above saves space, requires less Freon, while its reduced weight and size mean lower cost.

With the P-K Type FO Internal-Fin Freon 22 Water Cooler the installation can be designed for a shell 2 diameters less and 1 to 2 feet shorter than with conventional plain or bare tube coolers. This is made possible by the use of ¾" O.D. x .035" gauge Revere copper tube drawn over a Revere aluminum extruded fin as shown above. Serrated surface of the fin enhances refrigerant vaporization.

By making both the tube and the extruded fin, and assembling them in the same plant a tight contact between the two metals is assured, thus establishing maximum heat transfer. Once again Revere has helped fit the metal to the job, money was saved and a more efficient product produced.

Why not consult with Revere's Technical Advisory Service and take advantage of its extensive knowledge in "fitting the metal to the job." This Service has saved others money, why not you?

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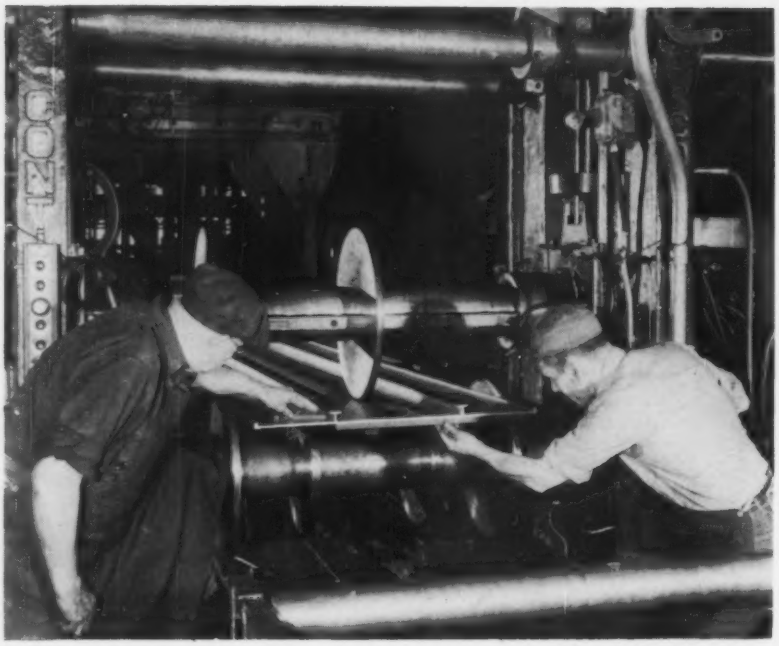
Mills: Rome, N.Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N.Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities. Distributors Everywhere.

Getting Ready for a Long Trip



FIRST LEG: Sheet made by Aluminum Co. of America is flattened into 34-in. widths before being shipped to the customer, the Martin Co. plant at Denver. There it will be stretch formed, chemical milled, welded and made ready to be sent winging another 6000 miles as the exterior skin of the Titan intercontinental ballistic missile.

Chances Fade for New Bulletin "F"

It looks more and more like the government will never issue a revised version of its Bulletin F—schedule of suggested useful lives of depreciable property.

Top Treasury officials now believe a new Bulletin F "might cause even more prolonged disputes than at present as to whether the normal life set forth in the Bulletin, or the prospective life measured by actual usage on the part of the taxpayer, or some other form of measurement, should control the depreciation period in any particular situation."

Instead of "F"—There are strong hints now that the government kill the long-pending revision of Bulletin F and rely instead on a complete overhaul of the country's basic depreciation laws. They fear simply revising the schedule would not solve any of the basic faults in national depreciation policy, and might work against passage of better laws.

Treasury officials indicate they support, among other proposals, a law to permit a taxpayer to ignore salvage value in figuring depreciation of equipment. Upon a sale at a profit the gain is reported as ordinary income to the extent of depreciation previously taken.

Why It Would Work—Such a move would help assure the life chosen by a taxpayer for depreciation purposes is the actual period the equipment is used. It would also benefit many taxpayers, the Treasury believes, and would be "a step in the direction of both fairness and simplification."

Treasury officials are spiking one of the pet proposals from industry: permitting a taxpayer to recover through depreciation the full cost of a machine plus a sufficient amount to pay the full cost of a new replacement.

Such an approach, Under Secretary of the Treasury Fred C. Scribner, Jr., told a recent meeting of the Tax Executives Institute, would get the government "into very shaky and untenable ground."

Merger Makes a First

If their stockholders approve, Magnethermic Corp., Youngstown, O.; Ajax Electrothermic Corp., and Ajax Engineering Corp., Trenton, N. J., will merge to form the first integrated induction heating manufacturer in the U. S. making both high and low frequency equipment.

Magnethermic Corp. has already acquired the assets of both Ajax companies.

If the merger goes through the parent company will be Ajax Magnethermic Corp., and the others the Ajax Engineering Div., and Ajax Electrothermic Div. Headquarters will be in Youngstown.

Building New Rocket

Flight tests of a cluster of rocket engines with an expected 1.5 million pounds thrust are slated by the Army for 1960.

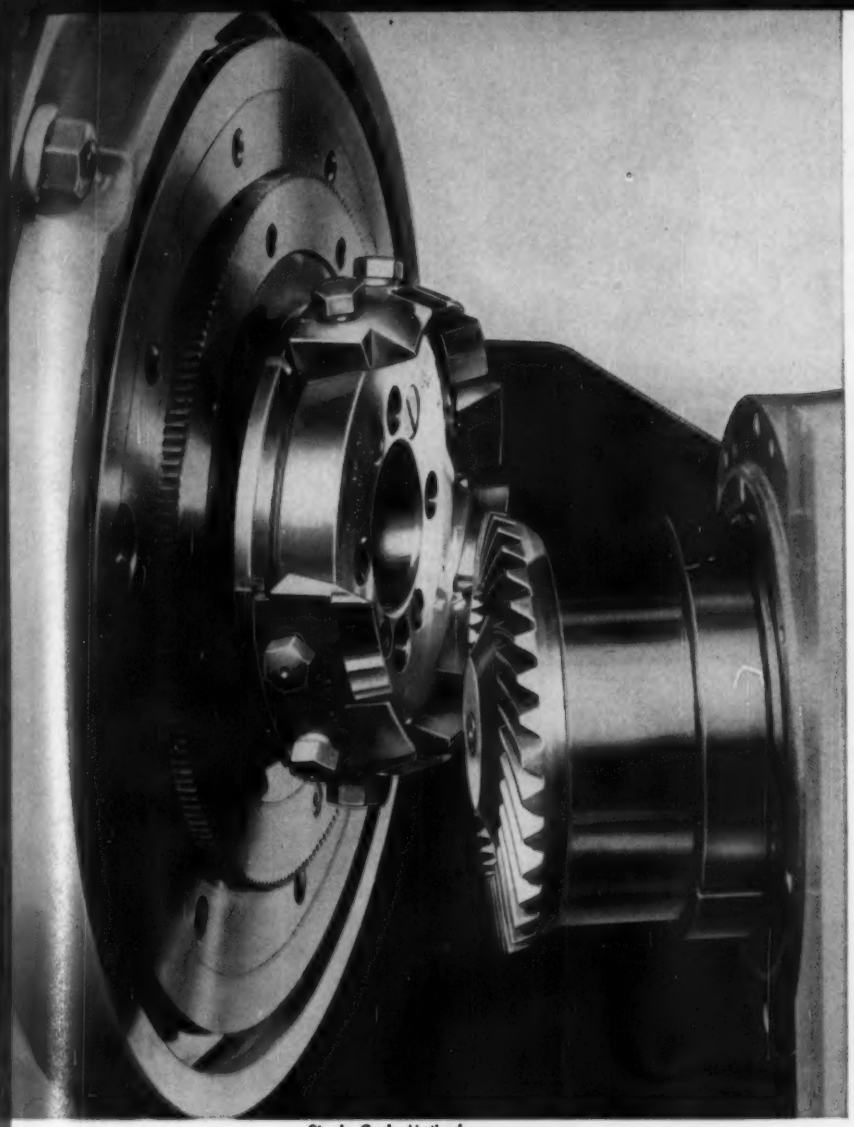
In a speeded-up program, Rocketdyne Div., North American Aviation, is building the new power package. The military agency responsible for the program, known as "Project Saturn," is the Army Ballistic Missile Agency, Huntsville, Ala.

York Named Top Man

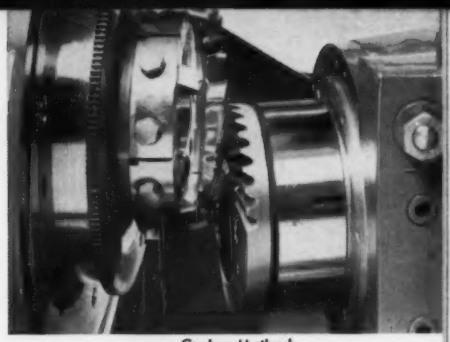
Defense Secretary McElroy has made clear in a new directive that Dr. Herbert F. York is the top military missiles and space official.

Dr. York was appointed last December as Director of Defense Research and Engineering—a new Defense Dept. post. There had been some concern whether Dr. York or Roy Johnson, chief of the Advanced Research Projects Agency, was the missiles boss.

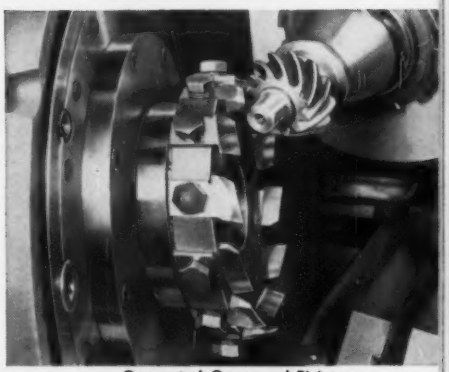
The 37-year-old Dr. York will supervise all research and engineering activities in the Defense Dept.



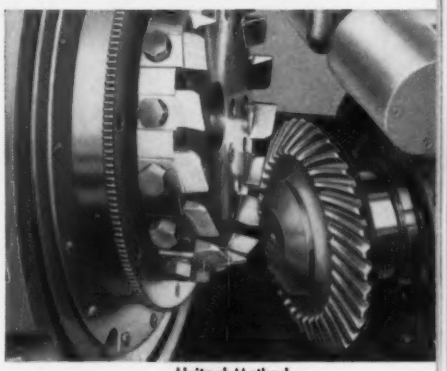
Single Cycle Method



Cyclex Method



Generated Gears and Pinions



Unitool Method

Cut gears with *four* different methods on *one* machine

If you expect your gear needs to change over the years you'll appreciate the exceptional versatility of the Gleason No. 108 Hypoid Generator. With this one machine you can cut both gears and pinions by four different methods:

Single Cycle® Method. Using this method you can cut nongenerated gears four to five times faster than previously possible on machines of this type. Cradle and work head are locked in position. The last rotation of the Single Cycle Cutter finishes both sides of a tooth space. You cut the mating pinions on the same machine using the conventional single-roll Generating Method.

Cyclex® Method. For certain applications you can use the extremely fast Cyclex Method on the No. 108 Generator. You cut nongenerated gears in one completing operation from the solid blank.

Generated Gears and Pinions. You can produce both gears and pinions on this machine with the Generating Method. Here, a relative rolling motion takes place between gear or pinion and the rotating cutter.

Unitool* Method. If you want to cut small quantities of spiral bevel, Zerol® bevel, or hypoid gears with a minimum of tooling, you can use the Unitool Method. You cut both gears and pinions with a single cutter. This method is particularly useful for experimental gears for prototype work.

The No. 108 Generator cuts gears up to 8½" diameter at a 10:1 ratio and to a maximum of 4 DP. You can get the same versatility in cutting larger gears with the No. 118 Hypoid Generator which handles gears up to 18" diameter, 10:1 ratio, to a maximum of 2 DP. A third model, the No. 28 Hypoid Generator, cuts gears up to 33" diameter at 10:1 ratio, 1½ DP.

Send for free bulletins on all three machines.

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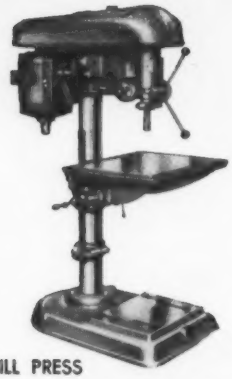

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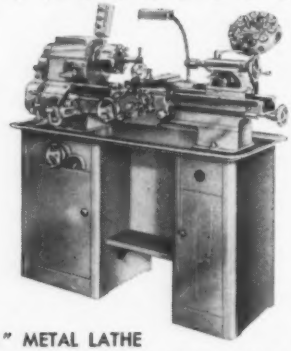

11" METAL LATHE
4' and 5' Bed, also Hand Screw Machine

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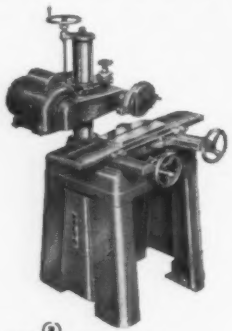
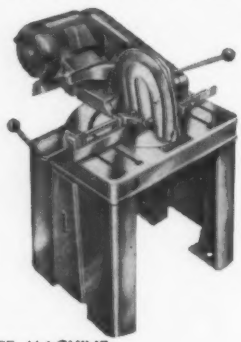
Also 14" and 14" Super-Hi Sensitive



TOOLMAKER® GRINDER
Surface, Chipbreaker, Tool and Cutter



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a proved way to cut metalworking costs

You can match the tool to your job for bigger savings—supplement or replace expensive, special-purpose machines—when you choose from the world's most *complete* line—53 Delta machines, 246 models, over 1300 accessories. Delta tools cost less to buy, less to operate, and less to maintain. They offer precision performance to meet exacting requirements even under rugged, production-line use.

And because you can combine standard Delta components with automatic control devices, you can have the money-saving advantages of automation at a fraction of the usual cost. Ask your Delta Dealer about Delta "lo-cost automation"—and see the complete Delta line of tools and accessories—he's listed under "TOOLS" in the Yellow Pages.

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Get all the facts on the complete line of Delta metalworking and woodworking tools and accessories. Write: Rockwell Manufacturing Co., Delta Power Tool Division, 640B N. Lexington Ave., Pittsburgh 8, Pa.

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another fine product by
ROCKWELL

Arthur Lehr

Pinning Down Steel Bar Quality

Bliss & Laughlin's Andy Lehr is one of the best-known men in the steel bar business.

A onetime wrestler, he is now using his weight to pin down steel quality.

▪ Arthur "Andy" Lehr switched from wrestling in college to wrestling with the steel market after he was graduated. He proved to be pretty much of a star at both.

Now president of Bliss & Laughlin, Inc., the largest independent producer of cold-finished steel bars, Mr. Lehr had his cap set for a career in the steel industry when he entered Lehigh University in the mid-1920's.

Ready to Work—An athletic fellow, he was Eastern Collegiate wrestling champion at Lehigh and did well at other sports, including football and lacrosse. He was in pretty good shape when he entered Bethlehem Steel Corp.'s loop course in 1929. His first job, as third helper on an openhearth, he took in stride.

After more than four years in Bethlehem's production department, he was transferred to the sales department. Learning to sell steel during a depression is about the toughest sales training you can get. Andy Lehr got a half nelson on the steel market and held on.

Up the Ladder—Altogether, he spent 16 years with Bethlehem. During the last five he had charge of the St. Paul sales district. Before coming to Bliss & Laughlin, he was executive vice president and general manager of the St. Paul Foundry and Manufacturing Co.

ANDY LEHR: Steel quality must be constantly improved.

His basic philosophy for selling steel is broad. He believes that quality standards for the entire industry must be constantly improved if markets are to expand.

Stickler for Quality—While it's been a long time since Andy Lehr has pinned an opponent to the canvas, he is now throwing his weight into pinning down steel quality. During the past few years, he has seen many of the improvements he championed become a reality in the cold-finished bar industry.

For instance, allowable variance on 6 to 7¾ in. cold finished bars have been reduced from .016-in. to .009-in. Also, with Mr. Lehr setting the pace, finishes on cold-drawn bars have been improved considerably in the past few years. Almost every major bar producer has followed Bliss & Laughlin's lead in making these improvements.

Little Spare Time — Mr. Lehr, who operates from B & L's general offices at Harvey, Ill., finds time in a busy schedule to take part in many community affairs. Among these:

A trusteeship on the board of Ingall's Memorial Hospital.

Board member and chairman of the industrial affairs committee of the Harvey Assn. of Commerce.

They're perfecting the Timken® steels you'll need tomorrow

THE steels for the products and designs you're planning for tomorrow are being perfected today—here in the Timken Company's new Metallurgical Research Center. We use the newest, most modern facilities ranging from an experimental melting laboratory and an X-ray spectrometer to one of the industry's finest technical libraries to study and evaluate new steel compositions—solve customer problems. For example, in our new Vacuum Fusion Laboratory (shown above) new steels are analyzed for impurities present in minute quantities.

Work like this developed the Timken Company's "16-25-6" steel, the steel that helped keep jets flying—now helps get missiles off the ground. For the steels you'll need or the steel problems you may have, call upon our experts for help. They've been developing new steels and solving hundreds of tough steel problems for 30 years. Call or write the leaders in electric furnace fine alloy steel production, The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.

THE CREEP-STRESS RUPTURE LABORATORY. Here we test the resistance of steels to deformation at elevated temperatures —as high as 1800°F. Tests made here help perfect special quality steels used in such applications as today's revolutionary steam generating plants.

TIMKEN® *Fine Alloy* STEEL

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

It Looks Good Through All of '59

With business levels almost restored to the 1957 peak, the recovery can be called complete.

Introduction of new, small cars will give a big push to the second half of the year.

▪ You can call the recovery complete, for all intents and purposes. Industrial activity is now only about two pct below the peak reached in August, 1957.

This is better than most businessmen expected and even better than most dared to hope for. There is no question about it. The recovery has been dynamic and it left in its wake only a minimum of irreparable damage.

Business Stable — You can look for business to be stable for some months. The principal fear is that the steel labor issue may mean trouble. There are two schools of thought here. One is that a serious strike could set the recovery back on its heels. The other is the possibility that a peaceful settlement would find steel users overstocked from strike hedging. This could mean that another period of inventory control would have a disastrous effect on the steel market and industry in general.

While you can't discount either of these possibilities entirely, there isn't much ground for real fear. A strike would delay the recovery, but it wouldn't halt it. On the inventory side, steel users are having enough trouble getting the steel they need to build up inventories that are now dangerously low.

No Faltering — Overall, there is no sign that any of the major factors in the economy are faltering. Construction continues good, the durable goods industries are stepping up operations. Demand for household goods is strong and so is the demand for farm equipment.

But the most important element in the long-range view (that is, eight or nine months ahead) is the stir that is bound to be created by the small cars coming out of Ford, General Motors, and Chrysler later this year.

Timing Good — The timing, in early fall, is perfect. Getting into production will involve a lot of work that will do much to ease the summer doldrums, particularly in the auto industry and suppliers.

Effect on the Market—There is a problem of what the new, small cars will do to the overall car market. One of the reasons why automakers were so secretive was the fear of killing off potential buyers who may decide to "wait and see" what they look like.

There are many indications that the point of no return on the small cars had been reached months ago, long before anyone whispered it audibly. But when orders for dies were placed recently, the need of continuing that pose was eliminated.

Best guess is that the few potential buyers scared off by the small car advent are a minor factor compared with the effects of new interest in the plans of the auto industry.

What Happened to Small Car Tooling?

▪ There is one negative aspect of the small car advent. Apparently the tooling bonanza that was confidently expected is not going to materialize. At least not to the hoped-for extent.

It's now clear that the automakers will be able to set up their lines largely with existing tooling. Machine tool builders had been confident that small car decisions would be followed up by tooling plans that would run into the many hundreds of millions of dollars.

Capacity Utilized—Probably because of the excess capacity constructed by the auto industry in recent years, they will be able to make do with a minimum of tooling.

Incidentally, this may be one of the reasons why the automakers could conceal their final decisions as long as they did. Big tooling orders or new plants would have tipped their hands, although most insiders realized months ago that decisions had been made.

Cost Is King—You can expect this trend to lowest possible investment in the small cars to continue. One reason the automakers hesitated to make the move is that downgrading their product will mean downgrading their profit per unit.

You can count on them to get the most possible mileage out of their tooling and all other expenses involved in the small car operation.

Engineering Shortage On the Way Back

With the revival of near boom times, the shortage of engineers is returning with a vengeance.

While top men were always in demand, even in the doldrums of last year, the overall shortage of engineering talent tended to disappear.

But there is a big rise in vacancies in engineering staffs, and it may be well to check your own.

Announcing...

Improved TUMBLEX "T" barrel-finishing abrasive

...harder...lasts longer ...saves more

Greater hardness now adds greater durability to Norton TUMBLEX "T" abrasive.

That's why you can count on this revolutionary barrel-finishing abrasive for greater staying power than ever before — and longer lasting ability to deliver its famous "Touch of Gold" advantages like the following:

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Send your samples of parts — large or small, simple or intricate — to our Sample Processing Department. We'll barrel finish with the most suitable TUMBLEX type abrasive for your work — "A" (random shaped ALUNDUM aluminum oxide), "T" (bonded ALUNDUM abrasive triangles), "S" (bonded ALUNDUM abrasive spheres), or "N" (natural stone) — and tell you exactly what's needed to improve your product quality and cut your finishing costs. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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Match the Man to the Project To Make Research Pay

By Dr. Irven Travis, Vice President—Research & Engineering, Burroughs Corp., Detroit.

Mis-matching of creative talent and too much control are the greatest dangers of research management.

Research men must be matched to the assigned task, then given latitude to carry it out.

There is a saying that research is the process of listening to nature with a sympathetic ear. You might say that industrial research is listening to nature with a mercenary ear.

The final goal of industrial research and development is the improvement of profits of the company. A successfully managed R and D program leads to the creation of salable products, improved production processes, or both.

Primary Steps—In management of technical talent to reach that goal, there are three major steps:

First, to establish objectives and to relate them to the company's needs. The program must fit the ability of the company to exploit it profitably.

Second, to avoid personal frustrations or conflicts of creative people by matching creativity and temperament to the job assignment.

Third, to exercise only those controls necessary to keep the program within the broad guidelines. Above all, avoid over-control. A director of research may lead, stimulate, inspire—anything but direct.

Aim Your Research — Almost every company has certain strengths and weaknesses which define the types of research necessary for its progress. For some, if their business is seasonal or very sensitive to economic conditions, research probably should be aimed at diversification.

But others should not diversify, if there are enough opportunities within their own field to grow without exhausting them. Then, research and development should be aimed at developing new and improved products for their specific industry.

My company is in this category. Currently, about half of our corporate-wide research and engineering goes into development of new products. About 25 pct goes into product improvement, 15 pct into fundamental work, and 10 pct into all other classes of services.

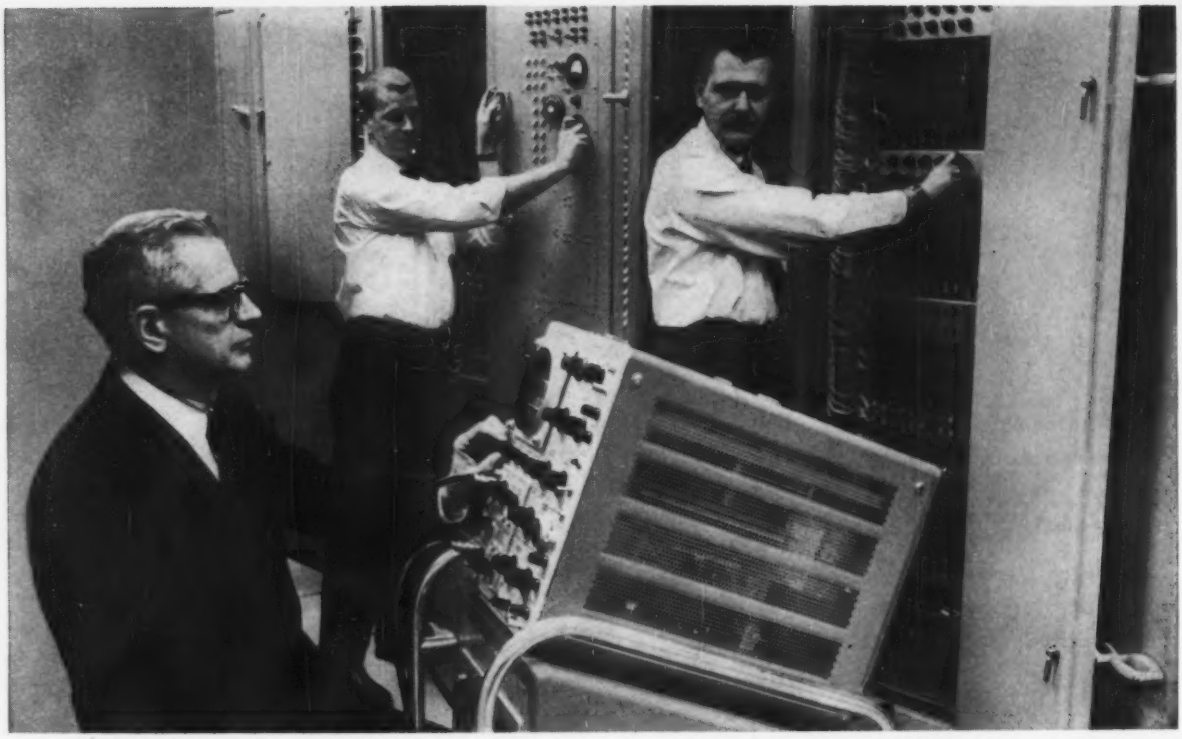
Push for New Products—In recent years, the technical opportunities for our industry have been so great that we and our competitors

From Campus to Industry

Dr. Irven Travis's interest in problems like developing the SAGE data processing system comes easily. During World War II he served, as a Navy Commander, as Chief, Anti-Aircraft Fire Control Section, Bureau of Ordnance.

But before coming to Burroughs in 1949, his field was education, specifically the University of Pennsylvania. There he was Professor of Electrical Engineering and Supervisor of Research at the Moore School.

He served as director of research at Burroughs through 1952 when he was named Vice President, Research and Engineering.



AT THE PLANT: Dr. Travis checks over SAGE computer, used in nationwide air defense network.

are compelled to spend more than we would like on new products. Rapid product obsolescence is peculiar to our industry and others like it where there is opportunity for growth.

These are just a few of the basic considerations top management must apply to formulate the broad objectives of its research. After these are determined, it is then the responsibility of technical management to translate these terms into a technical program.

Must Know Why — When the technical program is spelled out, the "why's" must be communicated to the research man. He must understand management objectives, and he must understand why he is working on today's assigned tasks.

He must understand how his results would be exploited by the company, and he should have a good idea of when and by whom. With this type of management understanding, the need for constraints by management tends to fall away.

Creative Profile — To manage technical talent, one must know something of the nature of the technical man. He is a sensitive individual whose greatest reward is a sense of accomplishment. Whatever more tangible rewards he may receive, if he cannot take pride in his attainments, he will be unhappy and ineffective. Rigid control of his time and unnecessary delays irk him.

If an individual is keenly interested and highly talented in a certain narrow field, you can be sure that whatever end objective is set for him, it will be accomplished by his pet technique.

Match Man to Task—It is in the process of matching the man to the task that success or failure will be achieved. You should not try to change a creative individual. The likelihood of success is negligible and, if you were to change a creative man, you could do so only at the expense of destroying his creative talent.

However, a technically trained man is trained to think reasonably and logically, so up to a point he is tractable. He can be encouraged to change his interest, but only by giving him a problem that is stimulating. In this way, he may be encouraged to widen his field.

Personnel must be assigned in accordance with their natural inclinations. A man who can develop and design in a specific field, using proven principles, will be ineffective if assigned to a job loosely defined and requiring original thinking. If a highly creative scientist is given a job hemmed in by decisions already made for him, an even poorer result can be expected.

Avoid Frustration—In my opinion, there is no greater single source of frustration and therefore ineffective use of technical personnel than a mis-match of the creativity of the individual and the creative opportunities of his job assignment.

A good match must be made between the talents and inclinations of the individual and the objective which his job is to attain.

Incidentally, if you have a young scientist in your company who has a creative mind, but is also extremely tractable, with broad interests,

he won't stay a scientist. He will become a manager.

Technical vs. Financial—In the operation of a research and development program, there are two types of control: technical and financial. But all too often there is less appreciation of need for technical control and more consciousness of financial control.

Financial control is well understood and can be applied by standard management techniques. Technical control is more subtle, more difficult to measure, and much more of an art than financial control.

Control, as it affects cost, is both functional and financial control, but primarily financial. Control as it affects profitable technical achievement, is both functional and financial, but predominantly functional.

Hypothetically, it is possible to plot these curves of "cost as a function of control" and "profitable technical achievement as a function of control." (See Charts.) The shapes of these curves are quite different.

Don't Over-Control—The curve of cost versus control starts at a high value, the luxurious operation which might exist if there were no controls at all, and drops to an irreducible level where no further control would be effective.

The profitable technical achievement curve starts at a low value, rises as control is increased to a critical peak value. Control beyond this point causes the output to decline very sharply to a small constant value.

It is evident from these curves that a certain degree of control is necessary, but that over-control is suicidal. The conclusion: One of the greatest dangers of mismanagement is over-control.

If too much control is to be avoided, then the need to control must be eliminated. This means good understanding at all operating levels of the objectives.

How It's Done—Here is an example of what can be done with technical control:

We have determined that certain objectives are of permanent interest to the company. Printing is one of them, because the end result of data-processing is a printed record.

We are always looking for ways to do it faster, cheaper, and better. Our present method of electrostatic printing arose from an R and D program on printing.

A young scientist was given the program, told to find a method of printing better and faster. He took on all fields of science, since we didn't care if it was done mechanically, thermally, chemically, or electronically. There were no retraints on the fields and it was a self-policing program for years.

Points of Progress—What controls were employed? Monitoring a program like this is an informal procedure. He wrote progress reports, consulted with his supervisors. He was checked on ideas, which usually sounded constructive. He was kept on the job because he consistently made progress.

There are three questions to ask in checking a program of this type:

1. How resourceful is the thinking about approaches?
2. How astute is the selection of approaches to be followed?
3. How inventive is the program in finding out quickly whether an approach is likely to succeed. In a program like this, it must reveal early what is promising and what is not promising.

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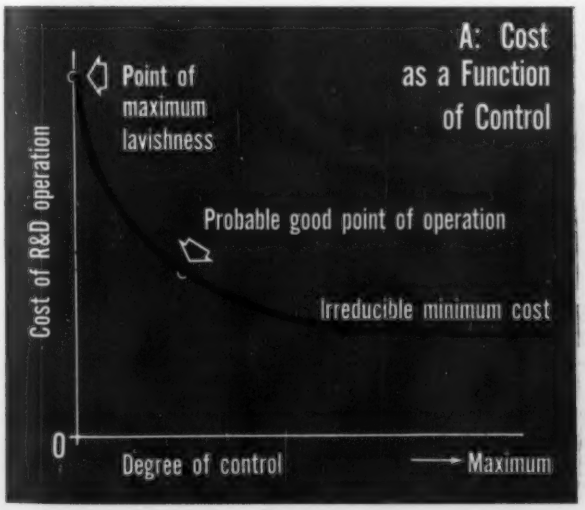
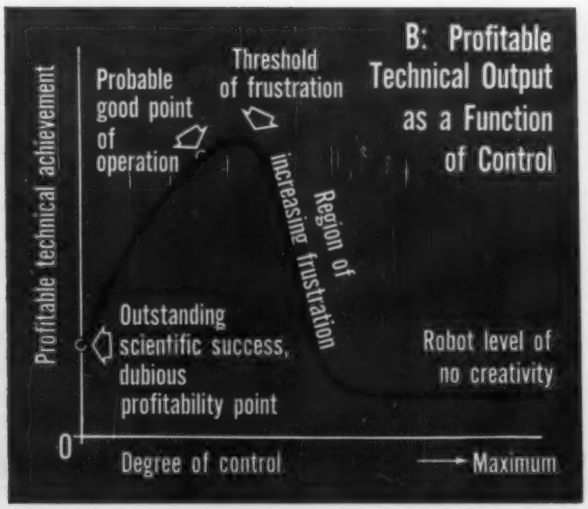
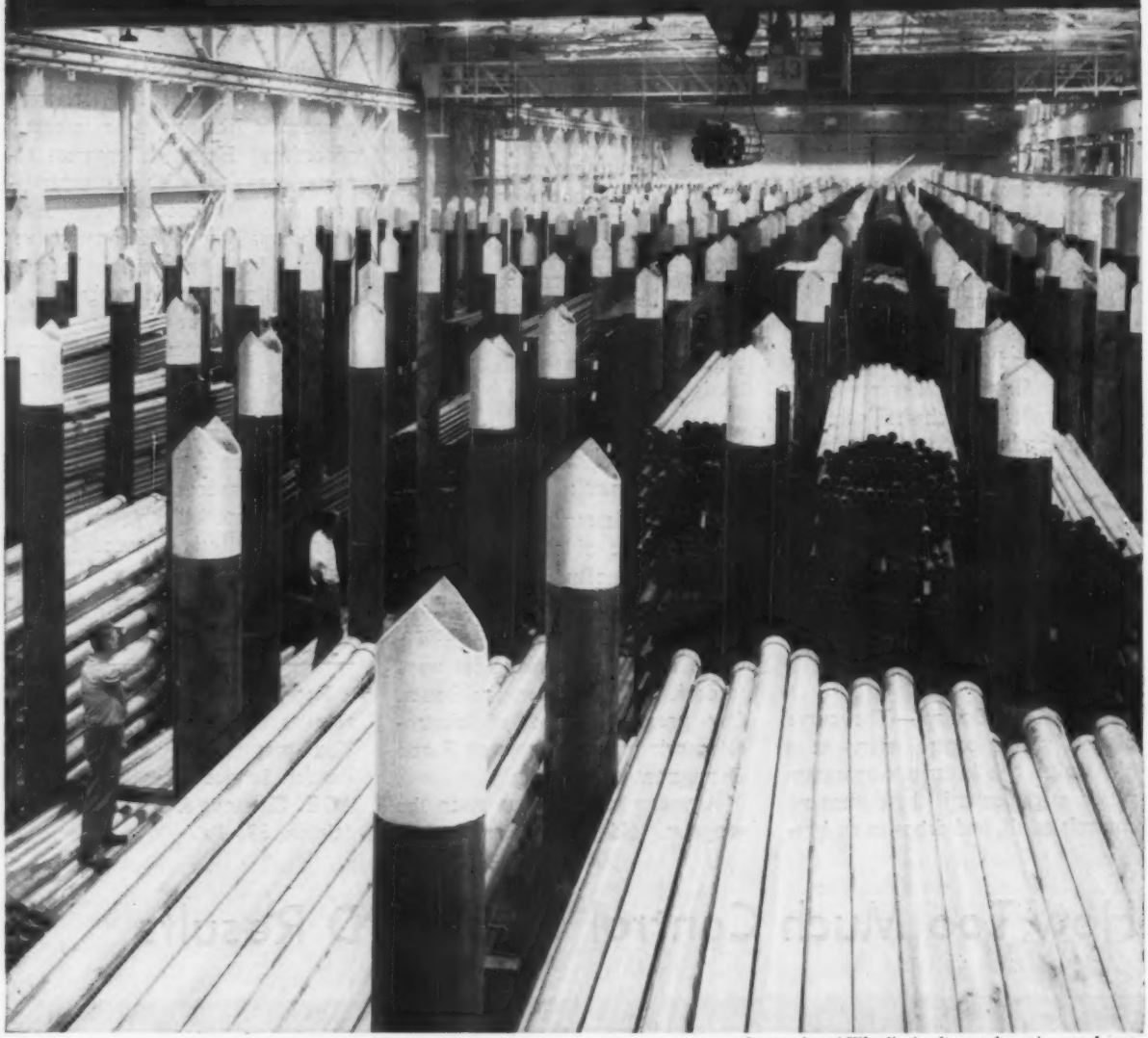
How Too Much Control Cuts R&D Results




B: Profitable Technical Output as a Function of Control
Probable good point of operation
Threshold of frustration
Region of increasing frustration
Outstanding scientific success, dubious profitability point
Robot level of no creativity
Profitable technical achievement
0
Degree of control
Maximum

STEEL PIPE BY WHEELING



One section of Wheeling's ultra-modern pipe warehouse.

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Day of Flying 'Auto' Approaches

Chrysler's Aerial Jeep May Be the Prototype

Flight test for this newest vertical takeoff vehicle is only weeks away.

Although it's only slightly larger than a car, engineers are confident.—By H. R. Neal.

■ To millions of frustrated motorists caught in the jam of homebound traffic, a step toward liberation is due in April.

Chrysler Corp., one of three firms developing a "flying jeep" for the Army, (the others: Piasecki Aircraft Corp. and Curtiss-Wright Corp.) expects to flight test its entry within six to eight weeks. Granted, the eventual relief from traffic woes which it promises is probably still years away—but it's a start.

Size of an Auto—The wingless, aerial platform has a 380 hp six-cylinder, air-cooled engine to turn two eight-ft propellers enclosed in ducts—one each at the front and rear of the craft. Pilot, passengers and/or cargo are in the center.

Weight of the machine (is it automobile or aircraft?) is about 2000 lb. But it is slightly wider and longer than a conventional automobile. Length is 21 ft, width is 9.5 ft. Height, about 54 in., is about the same as current passenger cars. Aluminum alloy tubing is used for the framework. Fiberglass is utilized both for the ducts and to cover the frame.

Easy to Operate—Wingless aircraft aren't new. We have helicopters. But operation of most of these vehicles is not a simple matter. This, according to John V. Gorton, aerial research project manager for Chrysler's defense Engineering dept., is the big difference between the Chrysler vehicle and others. And it results from use of a simplified control system and the ducted propellers.

FLYING WINDOW FAN? No, it's a model of a flying utility vehicle being developed by Chrysler for the Army. C. C. Utz, Chrysler executive engineer, holds model on its side to show operating principles.

He said a number of control techniques were conceived and tried on early scale models. "The conclusion was reached that vanes arranged either in the inlet or outlet of the duct would provide a very simple and reliable means of control." In addition, he says, the final version won't require special skills to operate it.

Familiar Controls—"In the final vehicle we expect to have a standard steering wheel for turns, a foot pedal similar to today's accelerator to regulate speed, and a push button to take the car to desired altitudes."

However, the vehicle slated for April tests will have conventional helicopter controls. The Army, he explains, said a helicopter pilot will make the first test flights.

Vanes Are The Key—But Mr.

Gorton points out Chrysler's machine doesn't use the same principle for flight as does the helicopter. Unlike other small flying machines, this one has fixed-pitch propellers.

A series of vanes above the propellers control vertical movement while other vanes below the propellers control turning and roll. Speed is controlled by a "cascade system" of vanes beneath the machine which direct the slipstream in varying degrees.

Efficient Power Use — Other types vary propeller pitch like a helicopter for control. Another advantage claimed for this version is greater more efficient utilization of power. The duct around the propellers is said to give 25 pct more power than when the blades are not enclosed.

The flight test program will start with a series of tie-down and hovering tests to prove the theories about the ability of the craft to fly and demonstrate the new simplified controls. This will be followed by free-flight test to confirm operational, performance, stability and control characteristics of the vehicle.

What It Should Do—Some of the performance characteristics expected of the flying window fan include: ability to take off and land vertically, a speed of about 50 knots, and carry a 1000 lb payload.

Earlier phases of the development include some 800 wind tunnel tests, full scale static ground tests and analog computer simulation.

Holds Real Promise—In summing up his estimate of the importance of the current studies, Mr. Gorton said: "We believe the flying utility device is one of the most significant vehicles under development today. Such a simple, low cost, highly mobile vehicle would appear to be a valuable addition to the nation's military transport fleet.

"In addition, the flying vehicle concept holds real promise as a new mode of civilian transportation."

But how soon for the man in the traffic jam? Rather wistfully one Chrysler engineer estimated it could be ready by 1962 — if unlimited funds were available. Meanwhile, that's the target date for use by Army troops.

The prospect of men driving and flying the same vehicle through local traffic isn't too much to expect in an age of space flight.

Automotive Production

WEEK ENDING	CARS	TRUCKS
FEB. 21, 1959*	121,859	25,012
FEB. 14, 1959	115,491	24,907
FEB. 22, 1958	89,977	17,843
FEB. 15, 1958	101,656	18,709

*Preliminary Source: Ward's Reports

Export Helps Boost Renault Sales

Renault of France, sixth largest car manufacturer in the world, reports it manufactured a record 430,736 vehicles during 1958.

This was 28 pct greater than its 1957 output of 317,443 vehicles. Renault manufactured 367,673 automobiles, 41,512 trucks and 21,551 farm tractors.

U. S. Sales Up—Export of Renault vehicles increased 46 pct during the year, reaching a total of 170,654. Of these, 59,968 were sold to U. S. distributors, compared with 26,438 in 1957—an increase of 120 pct.

Sales of another French-built automobile are climbing in the U. S. Simca sales in January set an all-time high when 2700 cars were delivered in all parts of this country. Previous record was set last September when 1779 cars were sold.

T-Bird Sales Climb

Cumulative sales and current customer back orders of the four-passenger Thunderbird—introduced just a year ago—amount to more than 65,000 units. This is 22 pct more than the total three year production of the former two-passenger version.

The Bull of the Woods

Here's a brush and a piece of waste—Clean up this Hurrah's nest once in a while
OH, YEAH! HOH--WON'T I LEAVE THAT GUY A NOTE THAT'LL BE A NOTE! THAT WEASEL-- THAT RAT-- TH----
WHY LEAVE A NOTE? WHY NOT COME EARLY, OR STAY LATE, AN' KETCH TH' NIGHT GUY?
WHAT? AN' SPOIL A CHANCE TO BECOME FAMOUS? WHY, TWO GUYS ON ONE MACHINE HERE BECAME GREAT WRITERS FROM THINKIN' UP STUFF TO WRITE TO EACH OTHER!
T.M. Reg. U.S. Pat. Off.
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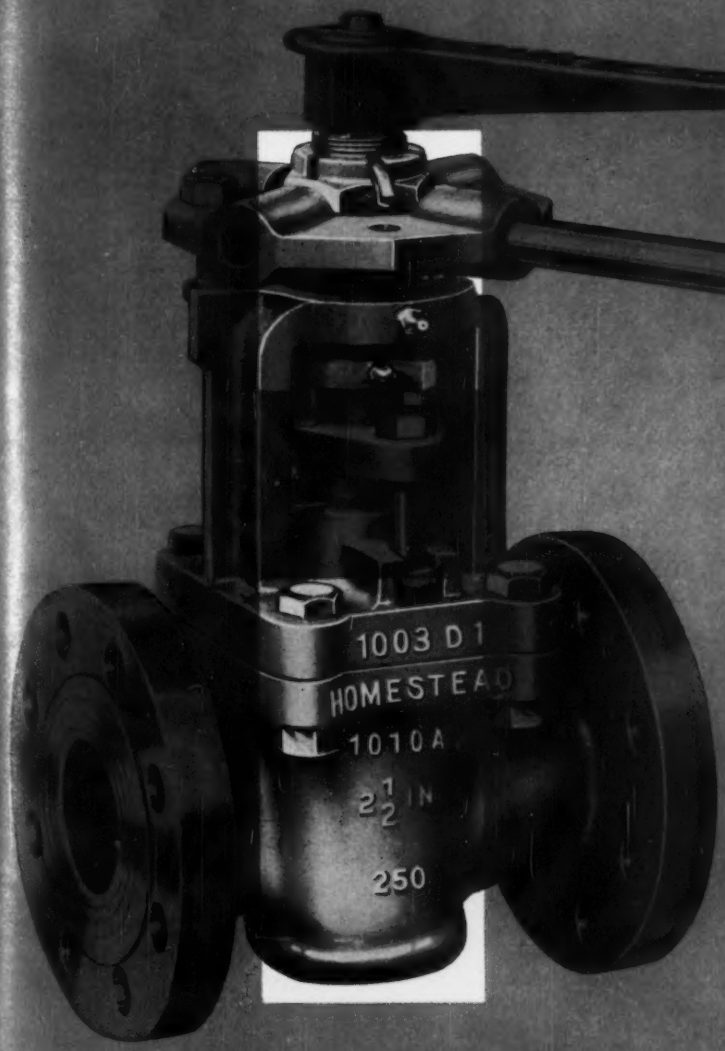
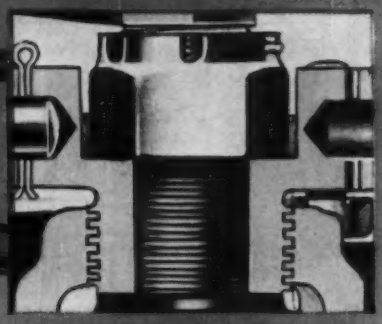
THE CORRESPONDENCE COURSE

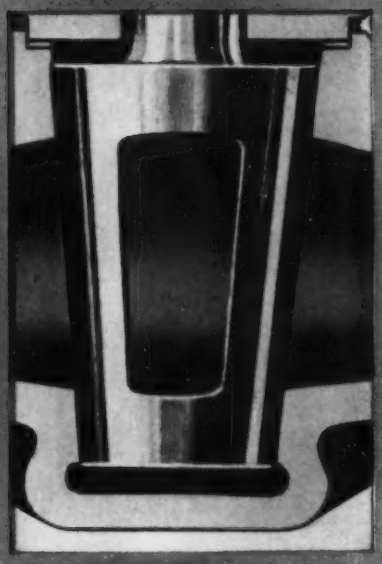
In the spots that count... Homestead® Valves are

STICK-PROOF





Built-in lever and screw affords instant operation



Seating pressure is mechanically relieved for easy turning

TROUBLE-FREE SERVICE is assured under all fluid, temperature and pressure conditions by the exclusive design of Homestead Lever-Seald Valves.

Instant stick-proof operation is guaranteed by a built-in lever and screw which mechanically relieves seating pressure. This controlled relief of pressure is only sufficient to overcome friction and to permit the plug to turn freely. What's more, all operating parts are protected from the damaging effects of corrosive or erosive service conditions and are completely weatherproof.

Write today for fully detailed Reference Book 39—Section 3. See for yourself how Homestead Lever-Seald Valves can solve your problems on high temperature, pressure or corrosive services.

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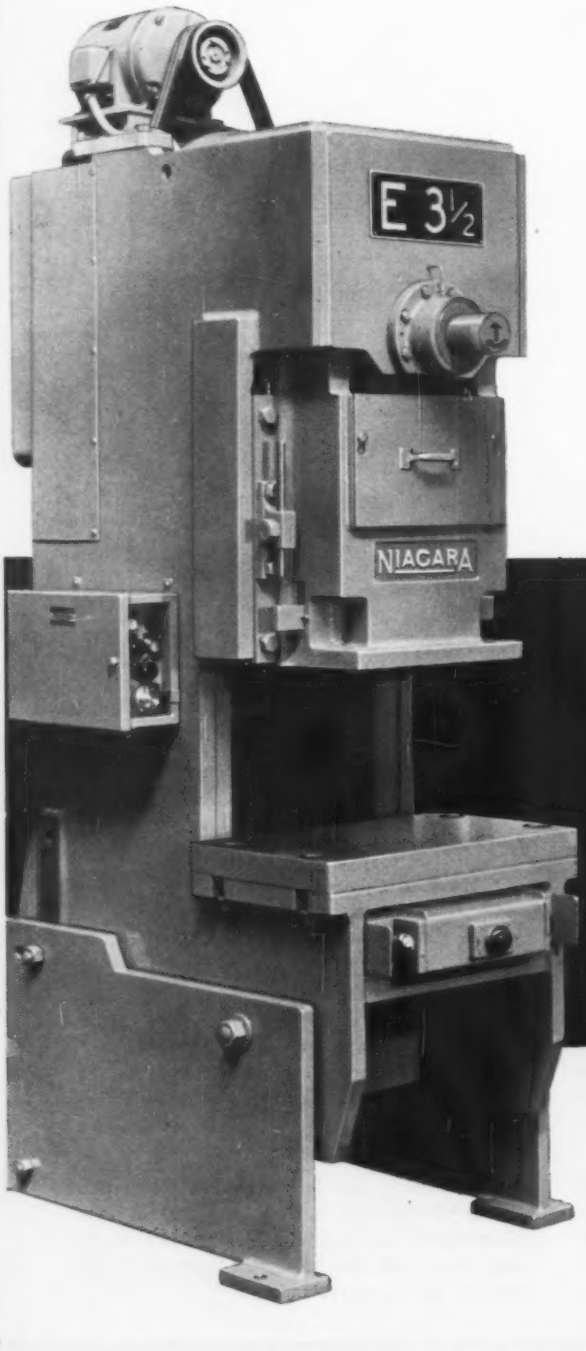
NEW! ULTRA-MODERN 45-TON OBI

added to Niagara's exclusive front-to-back crankshaft series



READY FOR YOU

. . . a brand new addition to industry's most advanced line of OBI's! Years ahead of any press within its range, this 45-ton newcomer is available plain or geared. The front-to-back arrangement of its 3½" crankshaft is, of course, a distinguishing mark of Niagara's famous Series E.

No other OBI press design has been so widely acclaimed. And no wonder . . . for no other OBI boasts so many unique advantages:

Full support to wide dies. Greater resistance to off-center loading. Accurate alignment of slide with minimized tendency to cock. Crankshaft deflection minimized. Substantially increased die life. Smoother, safer performance. Exposed overhanging gears, flywheel and other mechanisms eliminated. Less floor space.

GET THE FULL STORY on this new 45-ton wonder-worker as well as the 4 other sizes in the Series E family (up thru 200-ton capacities, and 7½" shaft diameters, standard and automated models). Write for illustrated Bulletin 56.

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N. Y.

SCAN THESE COST-CUTTING PRODUCTION-BOOSTING FEATURES

- Rigid crankshaft with close coupled main bearings each side of crank pin.
- Widest spaced OBI gibbing (L to R) in the industry permits wider box section slide to rigidly support a greater slide face area of full JIC dimensions. Guiding of slide is closer to point of die operation because there is no flange interference with gibbing.
- Longest gibbing in the industry, exclusive multiple "V" type, provides the most efficient guiding and accurate alignment of slide for greatest die life.
- Fully concealed, yet readily accessible, driving mechanism.
- Enclosed, rigidly supported gearing operates in sealed oil bath.
- Low inertia, pneumatic friction clutch and brake operate directly on crankshaft — the slowest rotating shaft.
- Precision, hardened, longer-wearing steel gears.
- Rigid, compact all-steel, box type frame.
- Power slide adjustment and power inclining device operate with new, unequaled speed.

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Ike Talks Plain to 'Spenders'

He'll Urge Tax Hike if Congress Jumps Traces

If you want to spend big, be prepared to pay the piper, President warns Congress.

Budget battle is a deadly serious business and a major campaign issue.—By G. H. Baker.

▪ A White House demand for higher taxes this year is a definite possibility. President Eisenhower is making it plain that he'll strongly urge tax rises if the Congress votes to spend far beyond income.

Reckless spending — that is, whooping it up on a scale not justified by income—just isn't going to get anywhere as far as he's concerned, Mr. Eisenhower declares.

Ike Means Business—Not only does he clearly threaten to veto any of this year's congressional spending plans that he believes are either unneeded or foolish, but he also lets the lawmakers know they'd better have a serious go at keeping federal income and outgo somewhere close to balance.

Congressmen that want to act like sports by voting big spending schemes had better be prepared to pay up like sports when the bills come in.

Tax Boost Opposition—The key shop: men in the Senate and in the House look coolly on plans to increase taxes, however. Chairman Mills, D., Ark., of the tax-writing House Ways and Means Committee, says bluntly he isn't going to approve of any plans for jacking up the government's tax-take short of war or all-out emergency. What's more, Mr. Mills also says he won't okay Mr. Eisenhower's January request for higher gasoline taxes. (Ike asks a 1½-cent rise on gasoline, a 2½-cent rise on aviation gasoline, and a new 4½-cent tax on jet fuels.)

"Unless there are compelling reasons of which I am now unaware," Chairman Mills says coldly, "I cannot vote to increase the gasoline tax to keep the highway fund on a pay-as-you-go basis prior to the submission and analysis of the cost allocation study due Jan. 3, 1961."

Partisan Issue—That would seem to kill off any hopes the Administration may be nursing for higher taxes.

Fiscal Afterthoughts

The White House is readying a supplemental money request for the fiscal year starting July 1.

The exact size and nature of the bid for extra money won't become known for several weeks yet. But Democrats in Congress already are angrily charging the White House with "fiscal dishonesty," saying Ike knew he wanted this extra money in mid-January, when he submitted his overall budget for the fiscal year that starts July 1.

Important "Discovery"—In other words, they charge, Mr. Eisenhower deliberately omitted some important items so as to present an apparently balanced budget. As a result, he is now "discovering" some important proposed expenditures.

Extra money for foreign aid and foreign loans is expected to account for the greatest portion of the supplemental money requests soon to be released by the White House.

No Comfort for 'Spenders'

"Mandate" For What?—Democrats in Congress claim they aren't worried by Ike's demands for economy in government. People voted for more federal spending, not less, they say. They claim the November, 1958, election results were a clear-cut "mandate" for more and costlier government programs.

Democratic headquarters received 99 answers to a questionnaire it sent congressional Democrats. They were asked if their voters want more government housing, less government housing, or don't consider it an issue. The results: 39 congressmen said their constituents want more federal housing, eight said no, and 21 said the point is not an issue with them.

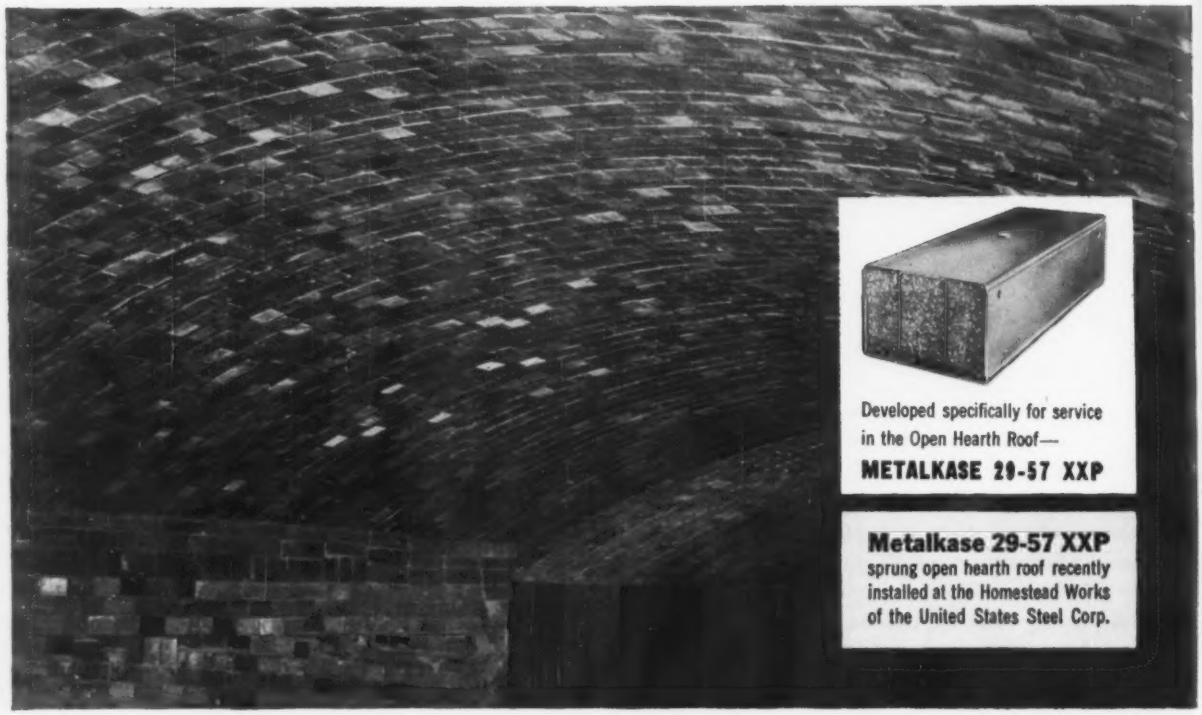
It's a Standoff—On federal aid to depressed areas, 35 said their voters demand positive action, five said help is not wanted, and 32 said it's not an issue.

On federal aid to community facilities, 36 said positive action is demanded, and seven said no.

School Aid Needed—On federal aid to school construction, 50 said action is demanded, six said no and 15 said it is not an issue in their districts.

Questions on budget and taxes were not included in the poll.

Another HARBISON-WALKER
BASIC OPEN HEARTH ROOF
among the many making service and tonnage records


Developed specifically for service
in the Open Hearth Roof—
METALKASE 29-57 XXP
Metalkase 29-57 XXP
sprung open hearth roof recently
installed at the Homestead Works
of the United States Steel Corp.

Accelerated progress in open hearth steel furnace practice involving larger furnaces, increased use of oxygen and higher rates of production creates demands for superior refractories. With the all-basic open hearth furnace becoming an economical reality, the development of new refractories having decidedly enhanced properties has been necessary. Harbison-Walker conventional and specialized basic refractories are fully meeting these requirements.

A fundamental development in the achievement of the all-basic furnace is the metal encased basic brick pioneered more than forty years ago by Harbison-Walker. Through constant research and extensive application experience, rapid evolutionary progress has resulted in the successful use of the metal encased basic brick for open hearth roofs, as well as for other furnace parts.

METALKASE 29-57 XXP internally plated metal encased basic brick are used in both sprung and suspended open hearth roof constructions of all designs with excellent service records. An exceedingly important contributor to the excellence of this refractory, developed specifically for the purpose, is the high purity magnesia produced by Harbison-Walker from Michigan brines. Fully stabilized as periclase of high density, it is an important constituent of this refractory having outstanding properties for the particular application.

The successful use of basic brick for roofs contributes to greater severity of conditions imposed upon other furnace parts. Harbison-Walker basic refractory products long established with excellent records, together with the newer specialized brands fulfill these rigid requirements for bottoms—walls—and regenerator checkers and make **THE ALL-INCLUSIVE, ALL-BASIC** Open Hearth Steel Furnace a reality.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES — GENERAL OFFICES: PITTSBURGH 22, PA.
World's Most Complete Refractories Service

Coming: Defense Contract Battle

East Out to Trim Farwest's Share of Awards

West Coast forces set to resist any moves to shift defense contracts eastward.

New York group contends it isn't getting fair share of awards.—By R. R. Kay.

▪ A political tug-of-war between the East and the West Coast is developing over defense contracting.

Some New York politicians and financial leaders are making an all-out fight to take some of the defense business away from California.

Led by Sen. Kenneth Keating (R., N. Y.), this group says that its state isn't getting a fair share of military business.

Shrinking Share — The group shows figures that prime defense contract awards were about evenly divided between the two states during the Korean War. But in fiscal 1958, New York got only 11.6 pct compared with California's 21.4 pct. That means $1 billion more for California than for New York.

The New Yorkers' battle strategy: Put political pressure on the Administration and the Pentagon to shift more contracts eastward.

Will the move succeed? California is ready to fight back. Both its U. S. Senators, Kuchel (R.) and Engle (D.), and all its Congressmen are united to resist any raids. The legislators say they're not politically impotent in caring for their state's interests.

Political Plotting — And both Vice President Richard M. Nixon and California's Gov. Edmund G. "Pat" Brown are well aware of the pivotal position of Farwestern votes on the 1960 political horizon. The defense business issue would certainly get full Coast support from Democrats as well as Republicans.

A likely New York move: Make the issue a loud gun in a Rockefeller - for - President boom. New Yorkers could try to embarrass the Nixon forces by playing up top-heavy California contracts.

What's Involved — Here's what New York would like to get a piece of:

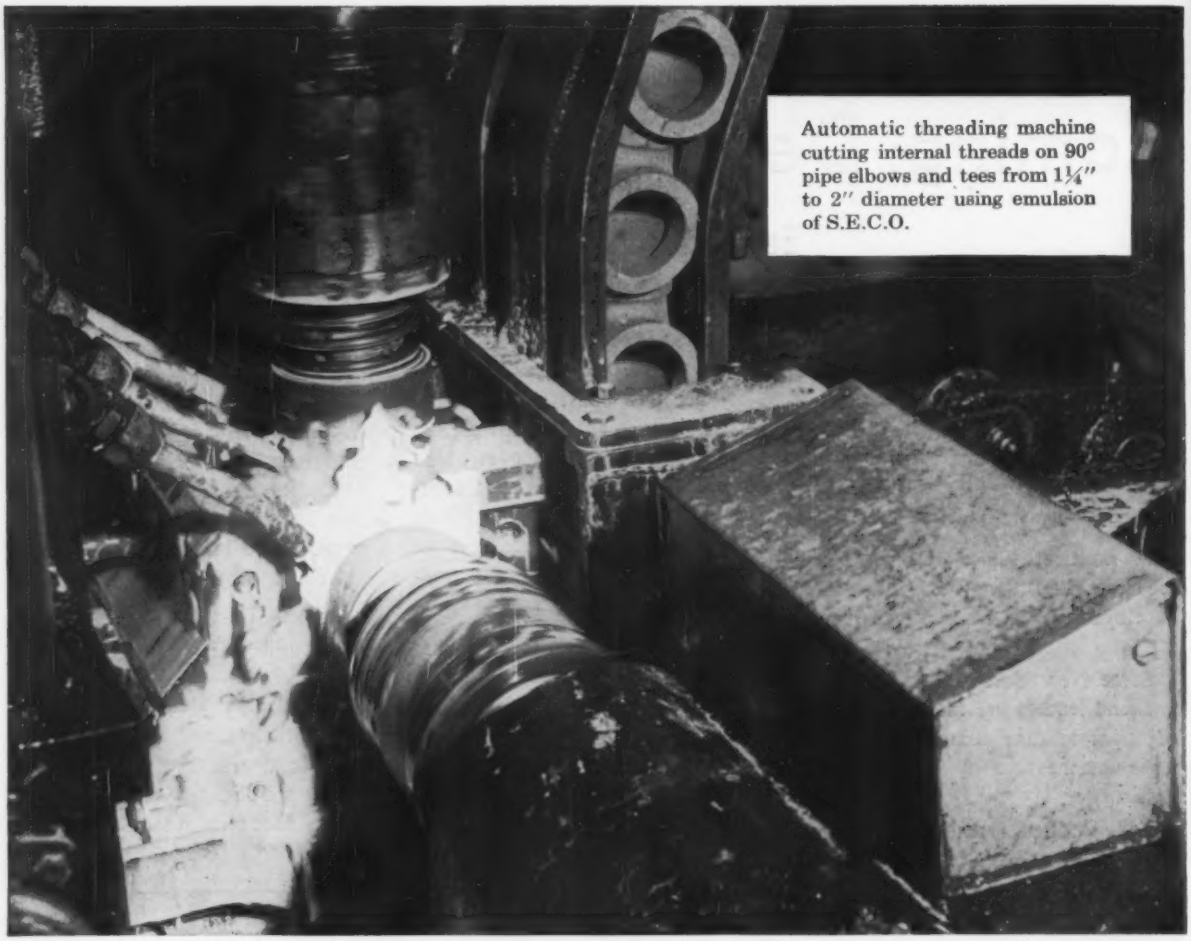
The Pentagon's latest rundown for fiscal 1958 shows six of America's top 10 defense contractors are based on the West Coast.

Boeing in Seattle ranks first in the nation with a staggering $2.1 billion. The California majors: Lockheed, $755 million; North American, $647 million; Douglas, $513 million; Hughes, $472 million. And most of General Dynamics' $1.3 billion in awards went to its Convair Div. in San Diego.

The aircraft-missile-ordnance industry in the Farwest says it will oppose with all its strength "any attempt to subvert national defense for political gain." All it claims to want is a free and open market where the military can buy best quality hardware at the lowest price.

Tracer Control Directs Flame Cutting

EIGHT AT ONCE: Electronic tracer guides eight torches on flame cutter at U. S. Steel Supply Div., Los Angeles. Unit can cut unlimited variety of shapes from plates, billets, or slabs up to 12 inches thick.



Automatic threading machine cutting internal threads on 90° pipe elbows and tees from 1¼" to 2" diameter using emulsion of S.E.C.O.

Photo courtesy of Grinnell Corporation

NEW S.E.C.O. EMULSIONS, WITH SMALLER OIL-PARTICLE SIZE, CUT PRODUCTION COSTS

There's a new and greatly improved S.E.C.O. (Sunoco® Emulsifying Cutting Oil), that has smaller emulsion-particle size to give you the following benefits:

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TRY *NEW* S.E.C.O.—for increased economy in all machining operations. Ask your Sun representative, or write to Department **IA-2.**

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Tool Builder Lays It On the Line

Ex-Cell-O Head Warns of World Market Threat

H. Glenn Bixby calls for new thinking to meet competition in expanding world trade.

The times call for an end to complacent thinking, builders are told.—By E. J. Egan, Jr.

▪ The phrases and the sentences slammed home with the impact of high-powered rifle bullets. Machine tool builder H. Glenn Bixby, president of Ex-Cello-O Corp., was really getting some things off his chest.

His topic: "Foreign Trade and Its Effect on the Machine Tool and Cutting Tool Industry." His audience: Members of the Assn. of Cutting Tool Manufacturers, assembled in Detroit.

A Critical Question—In a sense, Mr. Bixby could have been answering the question asked last week by The IRON AGE in its Special Report to Management: "Can U. S. Industry Hold Its World Markets?" (p. 93).

It's a critical question for the machine tool industry these days. And Mr. Bixby's company is no exception: "We at Ex-Cell-O have witnessed the drying up of our export volume. . ."

Root of the Problem—Then he started digging at the root of the problem: "This country's sense of supremacy has lulled us to sleep" . . . "Americans have the false impression that the rest of the world cannot get along without them" . . . "Believe me when I say that we don't have more than 10 years in which to get over this complacency."

To awaken his fellow builders and U. S. businessmen at large, he rang the alarm buzzer on certain warning signs they should heed: "Nationalism is spreading like a brush fire throughout the world" . . . "Iron Curtain countries and other foreign nations are making great strides in their technology; there are strong pressures in many countries to produce at home and to buy those product. . ."

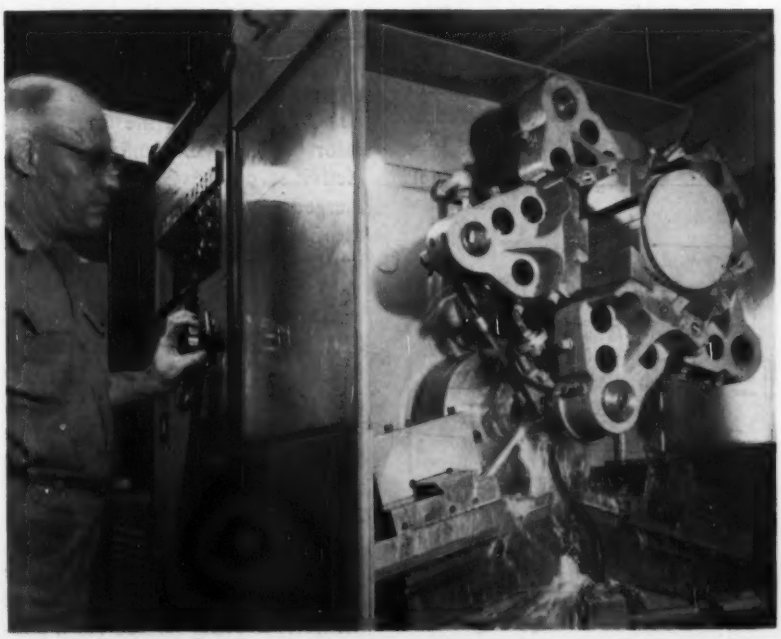
Tariffs Are Old Hat—The buzzer rang again, this time about tariffs. "Tariffs are among the last strongholds of medieval thinking," Mr. Bixby declared.

Then, risking the ire of high-tariff advocates, he threw a Sunday punch: "I propose that this country discard its protectionist principles . . . work instead to eliminate or reduce tariffs and other trade barriers . . . see that other nations reciprocate in reducing their barriers against our exports."

Facts of Life — Lest anyone should think it enough just to open up this two-way street, Mr. Bixby reminded his listeners of a few economic facts. "Grimly in the forefront," he said, stands this one: "That when the products of two companies are nearly equal, the customer will usually buy the cheaper one."

Needed: More Hard Sell—"Aggressive research in marketing, innovation in product design, and efficient production techniques will enable us to compete in . . . expanding world markets," he believes.

Real Production Workhorse



WELL EQUIPPED: Carbide tooling and air chucking on this Warner & Swasey automatic boost production for Bedford (O.) Gear & Machine Co.

INDUSTRIAL BRIEFS

Plumbing Plant — Bridgeport Brass Co., is building a plant for making tubular plumbing goods in Moultrie, Ga. The plant and equipment will cost in excess of $500,000. It will have facilities for machining, annealing, polishing and chrome plating the products.

Big Spender—A $5 million expansion program has been completed by the Permaglas Div. of A. O. Smith Corp. Expansion includes an office addition, warehouse, research and test facility, modernizations and additions to existing manufacturing plants in Kankakee, Ill., and acquisition of a water softener plant in Omaha and a water heater production plant in another marketing area.

Stocking Up—Brown & Sharpe Mfg. Co., Providence, R. I., has purchased Howe & Fant, Inc., E. Norwalk, Conn. Acquisition was by stock purchase. Howe & Fant will become a subsidiary known as the Brown & Sharpe Turret Drilling Division, Inc. It will continue to operate at the East Norwalk plant with its present personnel.

Divided They Serve—The Austin Co., Cleveland, has formed a new Mining and Metals Div. for specialized service to mining, concentrating and primary metal producing and processing industries.

"We start our whispering campaign today. Set the volume down low."

Gage Division—The L. S. Starret Co., Athol, Mass., has formed a new Gage Division with manufacturing, engineering and sales facilities to design and build complete special gaging equipment. The division will offer counsel and advice on special gaging problems and will manufacture "tailor-made" gages to meet requirements of any company.

Kaiser Coke—Kaiser Aluminum & Chemical Corp. will build a plant near Purvis, Miss., for calcining petroleum coke. The plant will include a rotary kiln and related handling facilities, with a capacity for calcining about 70,000 tons of coke per year. The plant will cost about $500,000.

Plate Special—McAleenan Brothers Co., Pittsburgh, formerly a subsidiary of Overly Mfg. Co., has been consolidated with the parent company. McAleenan will now be known as the McAleenan Plate Fabricating Division of Overly.

More Doors — The Steelcraft Mfg. Co., Cincinnati, will build an addition to its manufacturing area for increased production of its line of hollow-metal steel doors and frames. The plant expansion program follows the sale of its metal building division to the Inland Steel Products Co., Milwaukee.

Gale Sale—Infilco Inc., Tucson, Ariz., has acquired the Gale Separator Co. of Bloomfield, N. J. Activities of the Gale Co. will be merged with Infilco operations in the Coolant and Cutting Oil Cleaning Division.

Go East — The Pittsburgh-Des Moines Steel Co., opened district sales offices at New York City and Baltimore. PDM's New York City office is at 200 E. 42nd St., and the Baltimore office is located at the company's new fabricating plant at Curtis Bay station, Baltimore.

Supporters Rally—A new trade association, the Support Equipment Institute, is being formed for manufacturers in the missile and aircraft support equipment field. Heading the new group is I. C. Peterson, formerly director, technical services, Aircraft Industries Assn. An organizational meeting is scheduled for March 12, at the Statler Hotel, Washington, D. C.

Lath Vote—E. G. Collins, metal products manager, National Gypsum Co., Buffalo, N. Y., has been elected president of the Metal Lath Manufacturers Assn.; J. J. Ryan, vice president, Bostwick Steel Lath Co., Niles, O., is vice president.

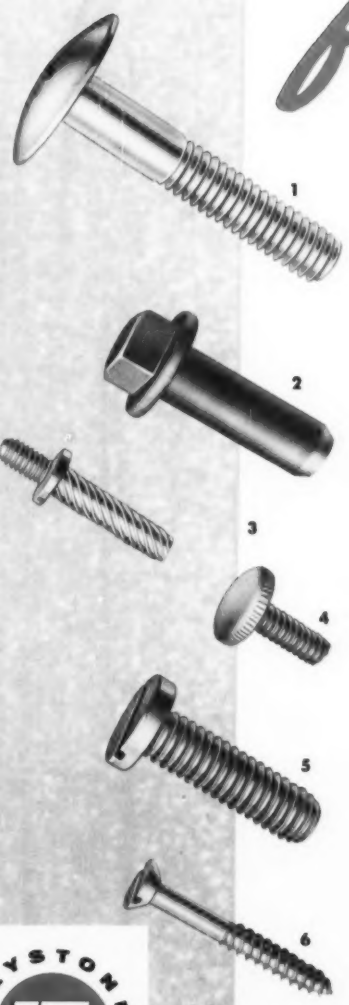
Auto Mouldings—The Mouldings Div., has been formed by H. K. Porter Co., Inc. The division will manufacture and market automotive and metal mouldings formerly produced by Herron-Zimmers Moulding Co., whose plants at Detroit and Frankfort, Ky., were purchased by Porter recently.

Engineers Honor Money—Fred B. Money, principal engineer, Baldt Anchor, Chain & Forge Co., Chester, Pa., has been named "Engineer of the Year" by the Delaware County Chapter, Pennsylvania Society of Professional Engineers.

Aluminum Price Cut — Kaiser Aluminum & Chemical Sales, Inc., has cut the price of aluminum rigid conduit for electrical installations by 10 to 14 pct. The aim: Penetration of the market supplied almost entirely by steel. The new per-foot, delivered price of Kaiser aluminum conduit now averages only 2-3 pct above steel.

Up in the Air—Wilson Brothers' subsidiary, Scaife Co., Pittsburgh, has contracted to acquire the air compressor product line of the Kellogg Div. of American Brake Shoe Co. Scaife produces pressure vessels for industrial use, and rocket and missile components. The Kellogg Div. is located at Rochester, N. Y.

Down River—A new warehouse building at 144 Thalia St., New Orleans, now houses a complete factory stock of wire rope manufactured by the Macwhyte Wire Rope Co. of Kenosha, Wis.



flowability

IS THE SECRET...

of INDIANA METAL PRODUCTS CO.'S continued success in cold heading quality fasteners

"Our objective is to give our customers a superior product at a competitive price," says Norbert Schroeder, General Manager of Indiana Metal Products Co., Division of Textron Inc., Rochester, Indiana.

To achieve this goal, Indiana specifies Keystone "XL" Wire for the manufacture of cold headed fasteners. "XL" *flowability* keeps costs competitive by eliminating downtime and secondary operations as well as increasing tool life. *Flowability* makes a superior product free from fractures, with perfectly filled corners, collars and excellent surface characteristics. This results in superior products at lowest cost.

Keystone "XL" Wire can help you, too, produce a better quality product at a competitive price. Talk it over with your Keystone representative—or call us—today!

XL's *flowability* makes possible . . .

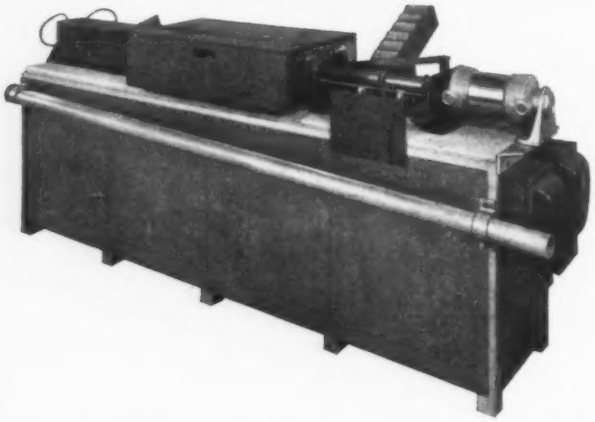
1. Bleacher bolt—extra large head, deep Phillips recess—2 blows **2.** Brake assembly stud—round collar and square head formed simultaneously **3.** Plastic-to-metal fastener—2 blows—2 diameters plus collar **4.** Adjusting screw—5 diameters **5.** Flat pan head—must be perfectly flat **6.** Twin-fast wood screw—headed and slotted in a single blow. XL quality makes possible roll threading of this twin-fast screw with sharp *double lead* threads

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE

WIRE FOR INDUSTRY

NOW INDUCTION HEAT COSTS EVEN LESS



with new Multiductor* power

*Trademark

- A typical Multiductor costs as little as ⅔ as much as conventional motor generator type equipment. *So much for initial cost.* Now, consider operating costs and other advantages.
- Multiductor is a *static* power source. There are no moving parts . . . nothing to wear . . . the units are compact . . . are completely assembled in the factory . . . installed at lower cost . . . and maintenance costs vary from negligible to non-existent.
- Multiductor takes standard 3-phase power at 60 cycles . . . and efficiently delivers single phase power at 180 cycles to the Ajax heater. The 3-phase load is inherently balanced at 0.9 power factor or better at the Multiductor input.
- Even the most inexperienced operator quickly becomes a Multiductor expert. Operation is almost entirely automatic. Damage by overload is practically impossible.
- Multiductors are now being used successfully for a variety of heating applications such as heating for forging, graphite heating, carbide processing, etc.
- An entirely new idea in induction power, Multiductor has completely changed the cost picture of induction heating. We're proud of the acceptance Multiductor has achieved . . . proud to add Multiductor to a long line of Ajax pioneered improvements in induction heating and melting.
- Write for more information given in Bulletin AM-2. If you wish, we'll gladly have an Ajax engineer call on you at your convenience. Or, stop at our plant for a demonstration.
- Ajax Electrothermic Corp., Trenton 5, New Jersey is exclusive licensee for Multiductor under General Engineering Co. patents.

Induction heating & melting

AJAX

NORTHRUP

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY—AJAX ENGINEERING CORPORATION

Dr. C. A. Stiegman, promoted to director, research, Hooker Chemical Corp., Niagara Falls, N. Y.

B. H. Boatner, named president, Westinghouse Electric Supply Co.

C. W. Shattuck, elected president, McKiernan-Terry Corp., Harrison, N. J.; **Frank Hamilton, Jr.,** appointed vice president and general manager, Dover Works.

E. W. Schaw and **F. L. Sargeant,** elected vice presidents, Reynolds Aluminum Sales Co.

W. G. Reynolds and **J. M. McConnell,** elected executive vice presidents, Reynolds Metals Co., Richmond, Va.

J. V. Banks, appointed asst. general manager, Montebello fabricating division plant, Kaiser Steel Corp.

H. L. Cogswell, elected vice president, sales and service activities, machine tool, coolant cleaning equipment, and honing divisions, Barnes Drill Co., Rockford, Ill.; **Roger Marriott,** elected secretary and treasurer; **H. A. Johnson,** elected vice president, engineering and manufacturing.

J. I. Doherty, appointed manager, Windsor, Conn., office and warehouse, Whitehead Metals, Inc.; **J. C. Simmons,** becomes associate manager.

F. C. Hyde, Jr., named assistant general sales manager and **H. F. Relyea,** becomes manager, New York district sales, Revere Copper & Brass Inc., New York.

T. F. Willers and **F. L. Bryant,** appointed general managers, Eastern Chemical Div. and the Phosphorus Div., respectively, Hooker Chemical Corp., Niagara Falls.

W. E. Stewart, appointed product engineering director, The American Welding & Mfg. Co., Warren, O.

E. R. Burghardt, appointed division controller, The Mouldings Div., H. K. Porter Co., Inc.

Dr. I. I. Bessen, named research supervisor, physical metallurgy section, Research and Development Dept., Jones & Laughlin Steel Corp.

L. M. Roberts, elected senior vice president, Research-Cottrell, Inc., Bound Brook, N. J.

H. G. Nafe, appointed manager, headquarters sales staff, Century Electric Co., St. Louis; **L. C. Schaefer,** becomes manager, engineering.

E. P. Miller, named manager, distributor sales, Los Angeles district, Linde Co., Div. of Union Carbide Corp.; **D. H. Thorpe,** manager, distributor sales, San Fran-

(Continued on P. 76)

T. G. Conway, appointed vice president, manufacturing, Pesco Products Div., Borg-Warner Corp., Bedford, O.

C. C. Morgan, named general superintendent, Geneva Works, Columbia-Geneva Steel Div., U. S. Steel Corp.

G. A. Jedenoff, named general superintendent, Pittsburg Works, Columbia-Geneva Steel Div., U. S. Steel Corp.

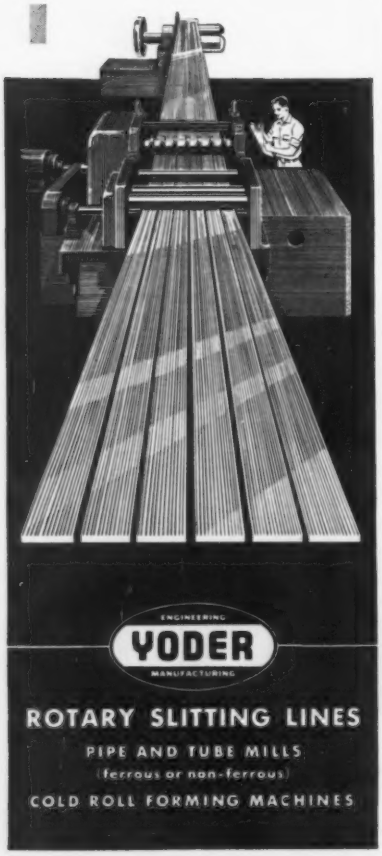
YODER

Rotary Slitters

Product dependability—integrity of manufacture—engineering for specific production needs have all contributed to establish Yoder equipment as the industry standard of excellence. Since 1909 Yoder-built machinery, including Pipe and Tube Mills, Roll Forming Equipment and Rotary Slitters, have earned world-wide customer satisfaction and recognition.

Profit from Yoder's years of engineering and service experience. Send today for the illustrated Yoder Slitter Book.

THE YODER COMPANY
5510 Walworth Ave., Cleveland 2, Ohio



(Continued from P. 75)

cisco district; **E. W. Scott,** manager, distributor sales, Pacific Northwest District with headquarters in Portland, Ore.; and **J. W. Dickinson,** manager, electric welding engineering, Pacific Northwest District, Seattle, Wash.

W. F. May, elected vice president, Executive Dept., American Can Co.

A. W. Taylor, appointed general sales manager, Mill Product Div., Carpenter Steel Co., Reading, Pa.

F. C. Ochsner, named a product manager, Metals & Controls Corp., General Plate Div., Attleboro, Mass.

W. P. Henkel, named Dayton district manager, Latrobe Steel Co., Latrobe, Pa.

J. H. Pimm, will become manager, Bridgeport Brass Co.'s new Moultrie, Ga. plant.

J. W. Thees, named production manager, Doehler-Jarvis Div., National Lead Co.

C. I. Hodgson, becomes manager, Doehler-Jarvis Toledo, O., Plant I, National Lead Co.

F. H. Yost, Jr., named assistant to the director, corporate relations, The Dow Chemical Co.

H. R. Bentley, named plant manager, Mound Road Engine plant and **V. P. Masi,** named plant manager, Trenton Engine plant, Chrysler Corp.

Jack Newlove, promoted to district manager, El Segundo, Calif. office, Vickers Inc.

R. M. Hindman, named sales manager, Doehler - Jarvis Toledo plants, National Lead Co.

S. E. Daily, appointed assistant superintendent, No. 3 Cold Strip mill at Inland Steel Co.'s Indiana Harbor Works.

R. E. Walther, appointed sales representative, Chicago, Stanley

(Continued on P. 80)

To help give you MORE than a motor

How Century Electric ships motors to save you handling costs

Receiving motor shipments in the easiest form for production line use can cut handling costs. If your operation works best with each motor shipped individually, Century Electric will send them that way. But, if you need motors in large lots, pallet shipments may help you. Here's how Century Electric motor pallet packing saves you money, time and handling.

Faster handling—Pallet shipments can be quickly unloaded—one man with a fork lift truck can unload a freight car in an hour. Unit loads can be retained in one form right up to the assembly line. Up to 80 small motors can be shipped in one pallet.

Simpler warehousing—Pallets are easy to stack, handle and count in a warehouse. It's simple to check inventory and plan for floor load and warehouse capacity.

Improves production—One tray of motors can be used at a time. Motors can be moved right to point of use and production workers don't have to lose valuable time handling materials. Disposable cartons are easily cleared away to make room for more materials.

Greater safety—Fewer injuries to workers and less damage to materials have resulted from the use of Century Electric pallet shipments. Production bottlenecks are minimized by the efficient flow of materials.

So whatever your shipping needs, Century Electric can supply the answer. This is just one more reason why you get *more* than a motor with Century Electric. For more information, contact your local Century Electric Sales Office or Authorized Distributor.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

58-12

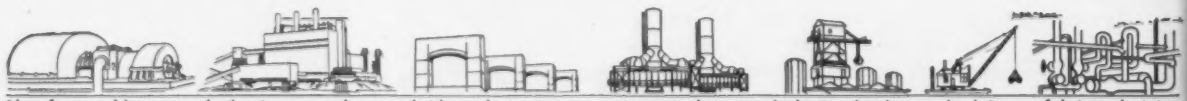
New Dravo-Lurgi Sinter Plant for Armco Steel

This Armco Steel Corporation installation at Ashland, Ky., is the first of several Dravo-Lurgi sinter plants to be completed. The new facility will make it possible to reclaim accumulated sludge and flue dust, increase the efficiency of blast furnace operation.

Built into extremely limited space, the plant receives and stores a day's supply of raw materials in eight hours. It then sinters twenty-four hundred tons per day for blast furnace charging.

The Armco facility is one of four new Dravo installations, two of which have capacity greater than any plant in the United States. For information on sintering equipment or the other products and services listed below, write DRAVO CORPORATION, PITTSBURGH 25, PA.

DRAVO
CORPORATION

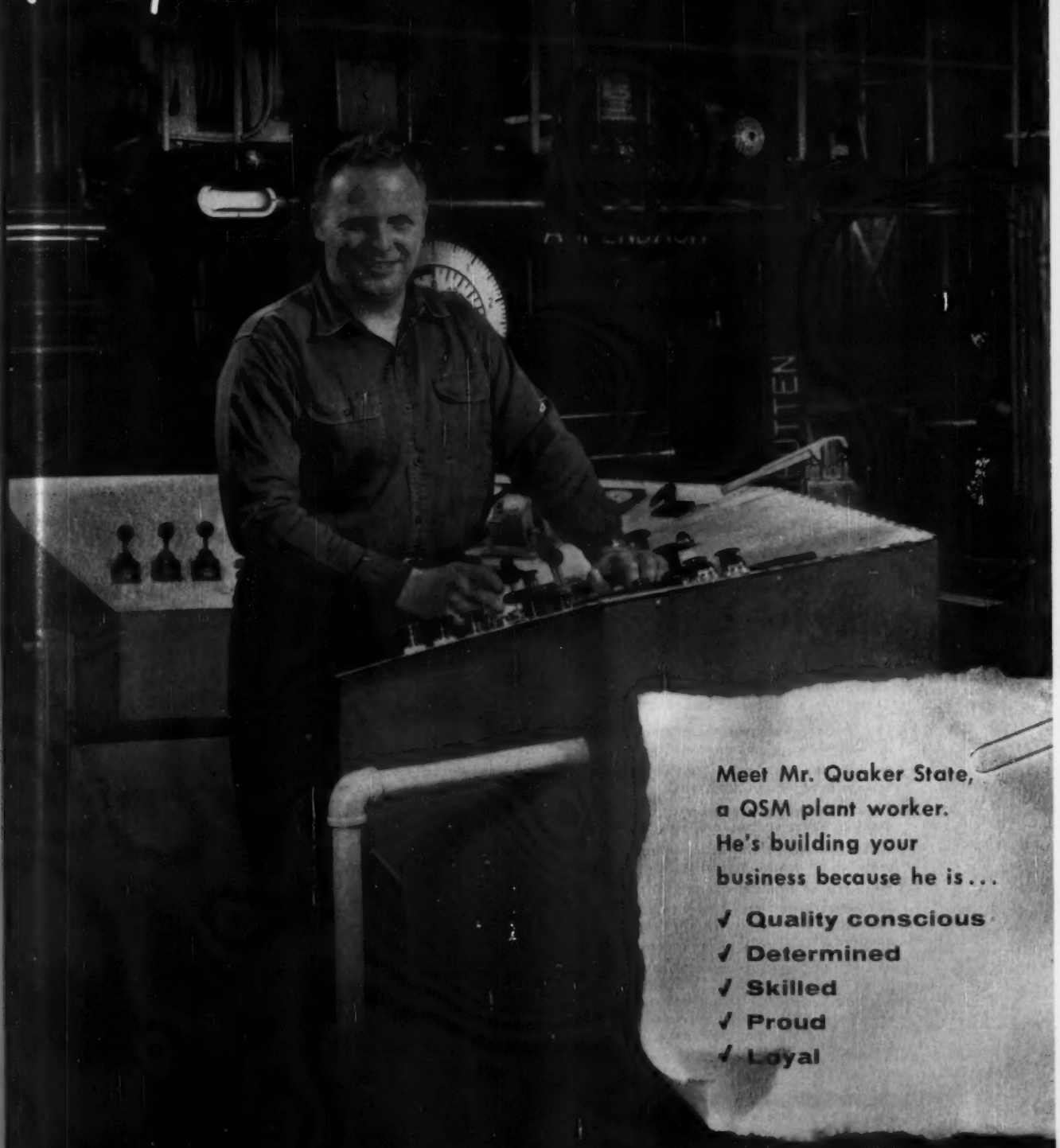


Blast furnace blowers • boiler & power plants • bridge sub-structures • sinter coolers • docks & unloaders • dredging • fabricated piping

foundations • gantry & floating cranes • gas & oil pumping stations • locks and dams • ore & coal bridges • process equipment • pumphouses & intakes

river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

People ARE BUILDING OUR BUSINESS



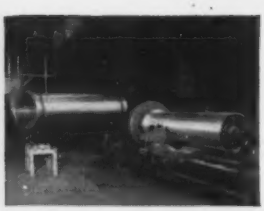
Meet Mr. Quaker State,
a QSM plant worker.
He's building your
business because he is...

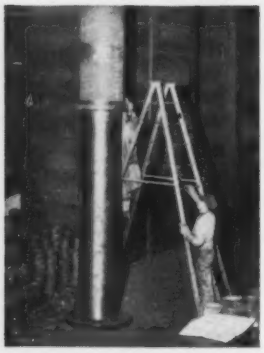
- ✓ Quality conscious
- ✓ Determined
- ✓ Skilled
- ✓ Proud
- ✓ Loyal

QUAKER STATE METALS CO. · LANCASTER, PA.

PACE SETTERS IN ALUMINUM

MILL PRODUCERS OF ALUMINUM SHEET · COIL · TUBING · AND BUILDING PRODUCTS





You save 5 ways with

SHENANGO CENTRIFUGAL CASTINGS

By using Shenango centrifugal castings for essentially symmetrical parts, you will gain considerable savings because:

1. **The Shenango process automatically eliminates hidden defects in the metal . . . insures fewer rejects.**
2. **No patterns required . . . an important saving, particularly on special or small quantity runs.**
3. **Finer, more uniform grain structure means smoother, faster machining, better control, and a higher rate of completion.**
4. **With Shenango centrifugal method control, there's less excess metal to be machined away, less metal to buy and ship!**
5. **Because of their homogeneous, pressure-dense qualities, Shenango centrifugal castings are stronger, have better wear resistance and require less frequent replacement. Maintenance cost is cut!**

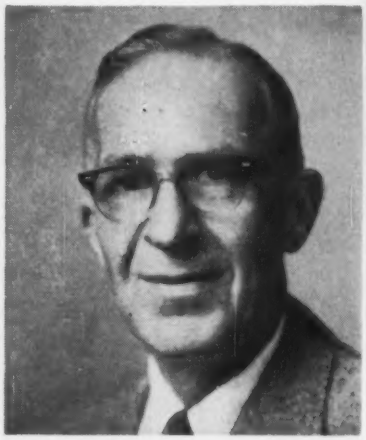
Check with Shenango on centrifugally cast parts for your needs —large or small castings . . . rough, semi-finished or precision-machined . . . ferrous or non-ferrous. They'll cost you less in the long run. For bulletins, write to: *Centrifugally Cast Products Division,* The Shenango Furnace Company, Dover, Ohio.

SHENANGO CENTRIFUGAL CASTINGS

COPPER, TIN, LEAD, ZINC BRONZES • ALUMINUM AND MANGANESE BRONZES
MONEL METAL • NI-RESIST • MEEHANITE METAL • ALLOY IRONS

(Continued from P. 76)

Steel Strapping, Div. of The Stanley Works, New Britain, Conn.



H. B. Upham, named district manager, Cincinnati branch office, Pratt & Whitney Co., Inc., W. Hartford, Conn.

Arthur LaDucer, named district sales manager, machine tool sales, Cincinnati territory, Pratt & Whitney Co., Inc., W. Hartford, Conn.

OBITUARIES

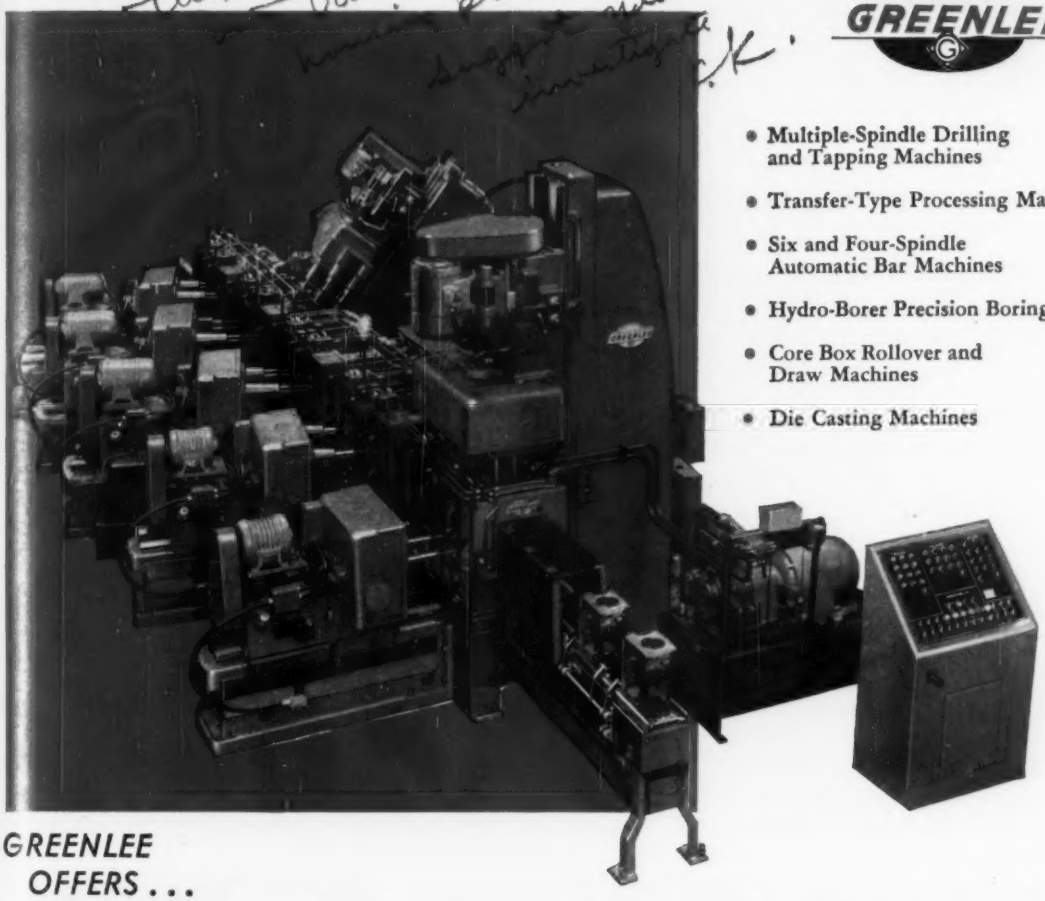
R. G. Patterson, 68, assistant to the president, Lamson & Sessions Co.

H. W. Campbell, 60, chief engineer, Interlake Iron Corp.

B. S. Hirschhorn, 60, manager, Non-Ferrous Metals Div., David Joseph Co., Cincinnati.

H. C. Taylor, 36, assistant general superintendent, Bessemer rolling mill, Tennessee Coal & Iron Div., Birmingham, Ala., U. S. Steel Corp.

Dave: this may solve Transmission problems. Suggest you investigate. C.K.



PRODUCTION MACHINERY
GREENLEE

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
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COOPERATION FOR AUTOMATIC PRODUCTION

The emphasis is on cooperation at Greenlee. Your ideas are added to Greenlee's. One idea sparks another. The result . . . the creation of machines that will meet your requirements efficiently . . . economically . . . now and in the future. Top-flight Greenlee engineers help you avoid costly mistakes. Their thinking is sound . . . respected. Call Greenlee. Let them give you the complete story on cooperation for automatic production.

MACHINES DESIGNED WITH THE FUTURE IN MIND

GREENLEE BROS. & CO.

1746 MASON AVENUE
ROCKFORD, ILLINOIS

Joe: these people frame a lot of machines in Detroit. Look them over and let me have your reaction – Sam

Granite City Steel reports up to 125 heats for tapholes "cast" with Permanente 165 Ramming Mix

New technique developed in cooperation with Kaiser Chemicals helps step up productivity of company's open hearth furnaces

Granite City Steel—whose outstanding modernization and expansion program has made it one of the nation's most efficient steel producers—has developed and proved a technique for "casting" tapholes when a furnace is down for ground rebuild. The "casting" practice (described in detail below) has produced the following exceptional results for four recent Granite City tapholes:

Furnace No.	Capacity	Taphole Life
22	250 T	125 heats
23	250 T	113 heats
24	250 T	92 heats
25	400 T	80 heats

Operators who have switched to Permanente 165 Ramming Mix consistently report exceptional performance—whether for new tapholes, for hot tapholes, or for furnace bottoms!

Permanente 165 is made from high purity Kaiser Periclase refractory grains (94-96% MgO) and ceramically bonds itself into a crystalline mass at relatively low temperature, providing fast furnace availability. This monolithic structure has exceptional volume stability, maximum resistance to hydration and to attack by iron oxide and slag. For furnace bottoms, its high density (averaging 175 pounds per cubic foot after firing) assures longer life.

Make your own comparison test and see how much more life you get with Permanente 165 Ramming Mix. Your Kaiser Chemicals sales engineer will be glad to show you this taphole casting technique or to help with any basic refractories job.* Ask to see the new 30-minute color movie, "Progress in Modern Basic Refractories." Your Kaiser Chemicals Sales Representative or Regional Office will be glad to make the arrangements.

*Ask for details on the new K/R Gunning System.

Call or write Kaiser Chemicals Division, Dept. S9121, Kaiser Aluminum & Chemical Sales, Inc., at any of the regional offices listed below:

PITTSBURGH 22, PA. . . . . 3 Gateway Center
HAMMOND, IND. . . . . 518 Calumet Building
OAKLAND 12, CALIF. . . . . 1924 Broadway

KAISER CHEMICALS

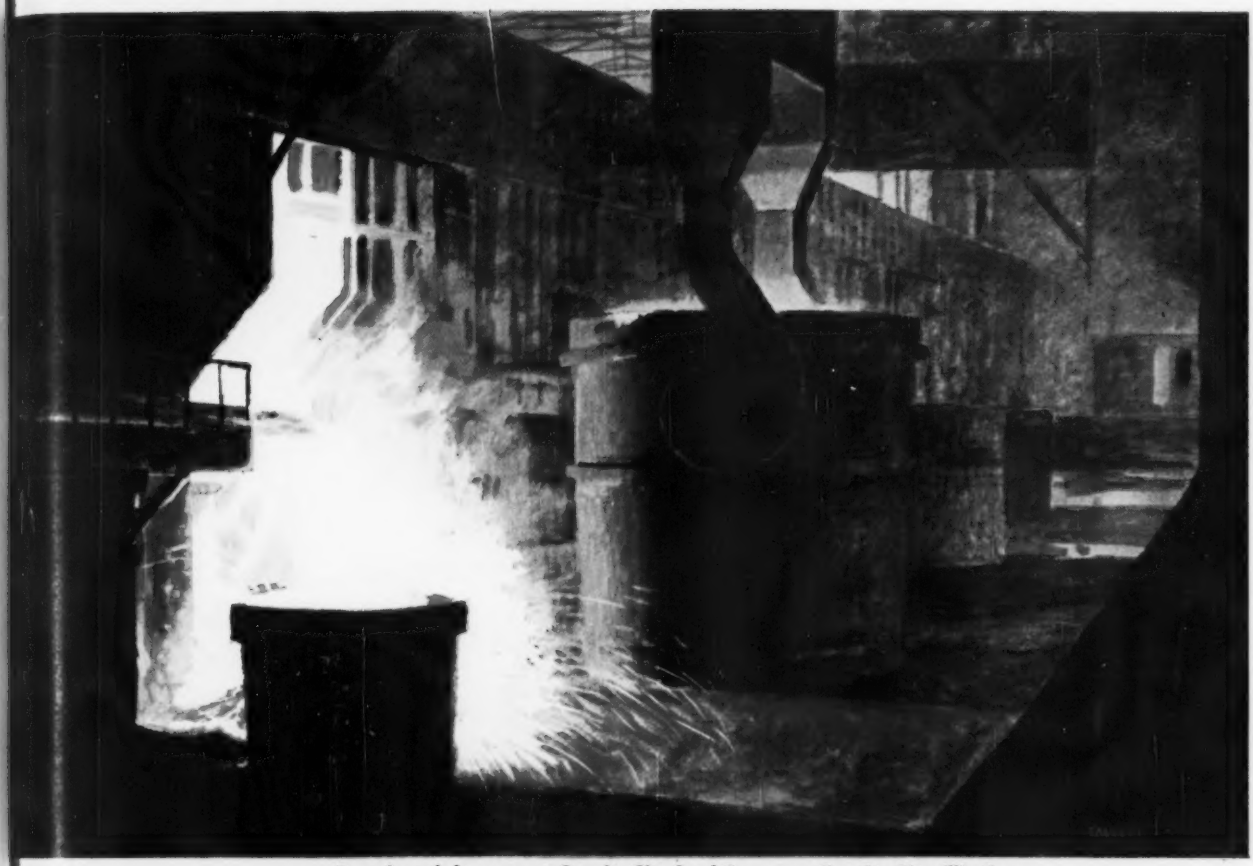
Pioneers In Modern Basic Refractories

REFRACTORY BRICK & RAMMING MATERIALS • K/R GUNNING SYSTEM
CASTABLES & MORTARS • PERICLASE • DEADBURNED DOLOMITE • ALUMINAS

1 In the Granite City Steel practice developed with Kaiser Chemicals, the first step is to dig out the hole to a diameter of approximately thirty inches. Although practices will vary from shop to shop, this digging usually goes down to brickwork under the pipe, and includes two to three feet of the flat in front of the pipe.

2 Next, a ¼-inch steel plate is welded to the casting in back of the furnace and a hole for the taphole pipe is cut in it at the proper height. The pipe is then set at the proper angle, with the back end protruding through the plate and the front end blocked up with brick . . . ready for the casting forms.

3 Carpenters erect a three-sided wooden form, following the indentations of the back banks as closely as practical. A "plug" nailed inside the front wall of the form fits into the pipe, supporting it so that blocking can be removed. Pipe is now welded to back plate . . . form solidly braced . . . and deck built around form.

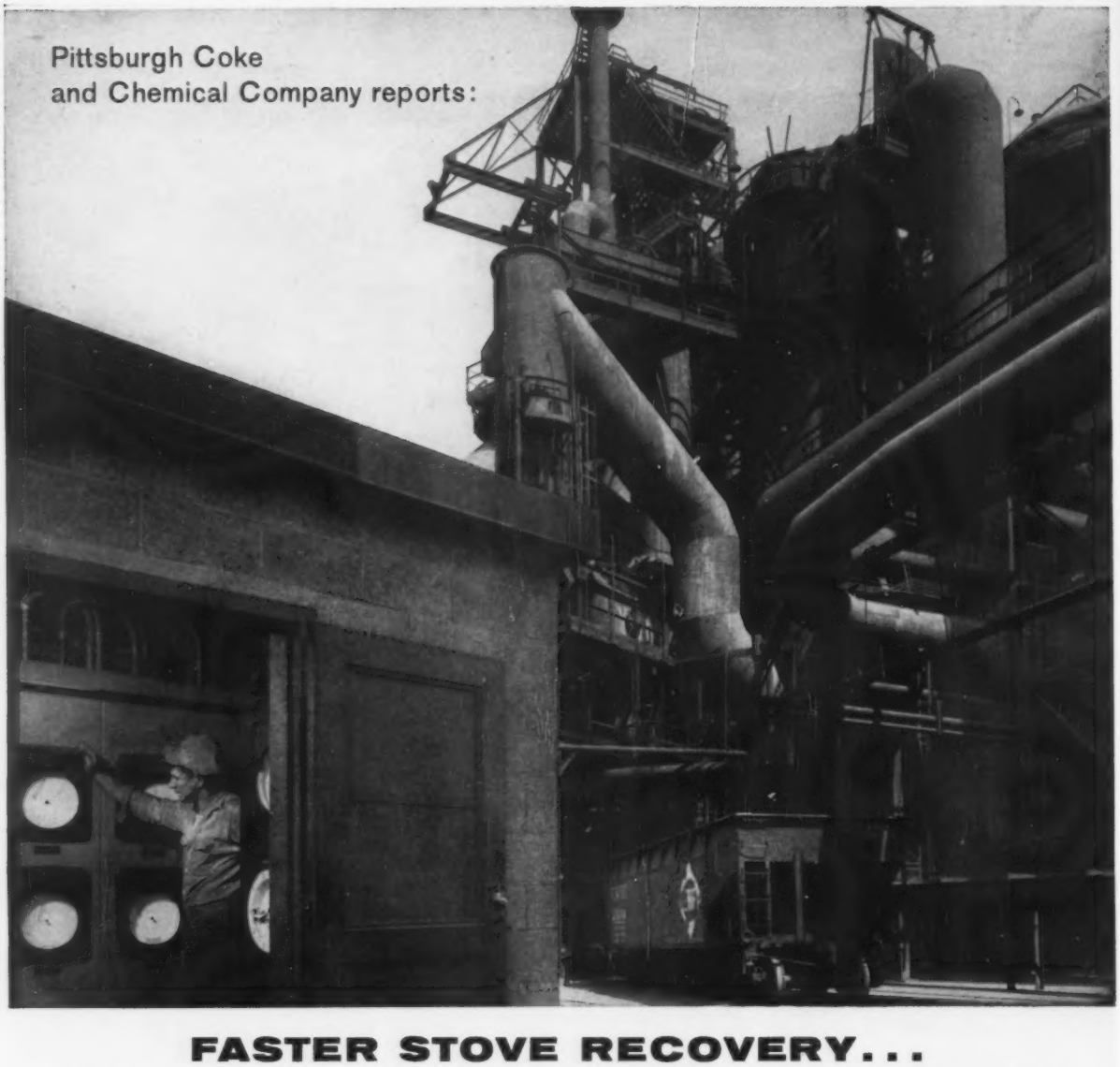


Open hearth furnaces at Granite City Steel Company, Granite City, Illinois.

4 The Permanente 165 Ramming Mix is mixed in either regular mixers or mixer trucks. From seven to nine per cent water is used. Mix is at proper consistency when a high-frequency cement vibrator immersed in the Permanente 165 produces a "jelly-like" appearance.

5 When the Permanente 165 mix is poured into the form, the vibrator is used to achieve uniform mix density around the entire pipe. *This is the important feature* of the cast taphole: uniform density of mix at least six inches thick around pipe. Excessive vibrating must be avoided to prevent floating out of bond.

6 Although forms can be removed after only three or four hours, life is improved if the Permanente 165 casting is allowed to cure for several days. After the form is removed, the small section of the flat in front of the casting can be filled either by ramming or casting.



FASTER STOVE RECOVERY...
CLOSER BLAST FURNACE SUPERVISION
with Foxboro Complete Blast Furnace Control

"Faster return to the control point after we change stoves," is just one of the things that Pittsburgh Coke and Chemical says about their Foxboro Blast Furnace Control System. Installed on a giant Merchant Furnace and Gas Washer, this system records and controls over 40 important variables.

Foxboro instrumentation makes furnace operation easier...permits automatic control from a centrally-located panel. And since *all* measurements are recorded on convenient circular charts, the Plant Superintendent finds it easier to supervise over-all furnace operation, too.

Pittsburgh Coke and Chemical's system uses both electronic and pneumatic instruments. Electronic recording gives fast, sensitive measurement of temperatures, pressures, and flows, while pneumatic control provides the smooth proportional control necessary for precise valve action.

As for maintenance, they report practically no interruption in service since their Foxboro control system was installed in 1952. Find out how Foxboro can improve blast furnace performance in your plant. Write for special data on blast furnace instrumentation.

The Foxboro Company, 802 Neponset Ave., Foxboro, Mass.

FOXBORO
REG. U.S. PAT. OFF.

BLAST FURNACE CONTROL SYSTEMS

How to Design and Check Bends In Welded Steel Tubing

Good, economical bends take proper planning.

For fewer rejects and less breakage, find out how far you can go with this versatile material.

Bending is the most common fabricating operation performed on welded steel tubing. It can be done with or without a mandrel. Each method has its own set of specifications and tolerances.

Many companies are using cold-bent tubing to replace welded elbows. It cuts production costs and makes for a better product. Experience shows that cold-bent tubing is actually stronger than straight tubing, owing to work-hardening which results when the tube wall is thinned during bending.

Here, according to the Product Development Committees, Formed Steel Tube Institute, is how to design for better bends.

Sans Mandrel—To find the minimum bend which can be made on tubing without a mandrel or other inside support, use the following formula:

$$L = \frac{0.2468\ \pi\ (D^2 - d^2)}{g}$$

L = Center line radius of bend
D = Outside diameter of tube
d = Inside diameter of tube
g = Wall thickness
π = 3.1416

Minimum radii for various size and gage tubes are listed in Table 1. The figures apply when outside diameter of the tube doesn't exceed 2½ in. and the angle of bend doesn't exceed 90°, or when the outside diameter exceeds 2½ in. and the angle of bend isn't more than 75°.

It's possible to obtain smaller radii, radii closer together, larger angle of bend, and other features not covered in the specifications. But such departures will increase costs, so stick to standard bends wherever possible.

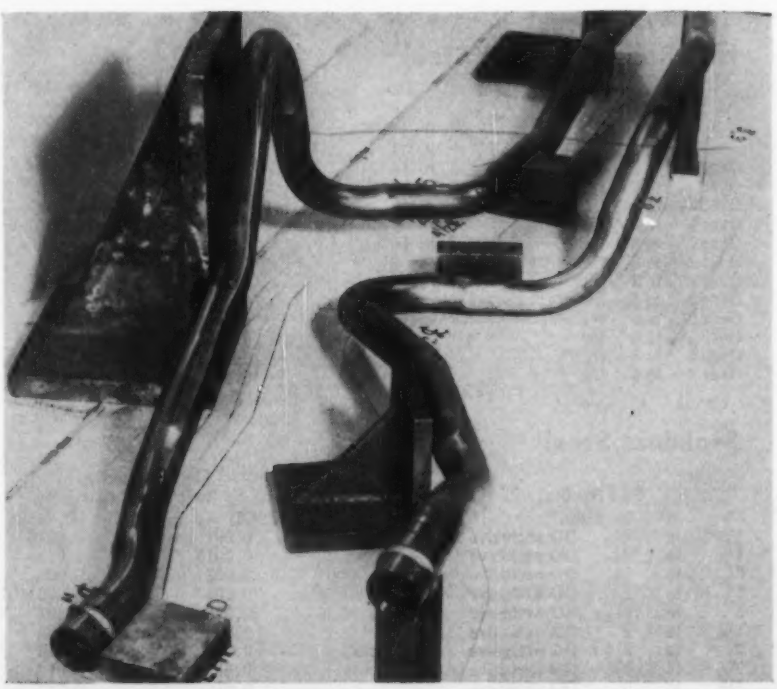
Minimum distance between non-mandrel bends is twice the outside diameter if in the same plane, and 3 x OD if in different planes. Distance between bends is considered as the length of straight section between the tangent points of two bends.

In order to maintain a true diameter at the tube ends, the distance between the theoretical tangent point of the bend and the end of the tube should not be specified closer than 2 x OD.

When sizing the ends of a fabricated part for either outside or inside diameter, tolerances to be held should correspond with those in Table 2.

Mandrel Does Best Job — The best bends are those made with mandrels. But the tools are expensive and the operation is slow, so cost of this method is often quite high. For this reason, the process is recommended only for bends where the metal must be kept smooth. Reduction in diameter where the bend occurs is very slight and the bend is free from wrinkles.

In light gages and for smaller radii, it's often hard to make even a mandrel bend that's wholly free



FINAL CHECK: Bends are gaged in both planes over full-size drawings.

Table 1: Standard Bends Without Mandrel

Diameter* Tube	Minimum Bend Radii*				
	14 Gage	16 Gage	18 Gage	20 Gage	22 Gage
½	1¼	1¼	1½	1½	1½
¾	2	2	2¼	2¼	2¼
1	2¾	3	3	3	3
1¼	3½	3¾	3¾	3¾	3¾
1½	4½	4½	4½	4½	4½
1¾	5¼	5¼	5¼	5¼	5¼
2	6	6	6	6	—
2¼	6¾	6¾	6¾	6¾	—
2½	7½	7½	7½	7¾	—
2¾	8¼	8¼	8½	8½	—
3	9	9	9¼	9¼	—
3¼	9¾	10	10	—	—
3½	10½	10¾	10¾	—	—
3¾	11½	11½	—	—	—
4	12¼	12¼	—	—	—

* All figures are in inches.

Table 2: Diameter Tolerances for End Sizing

Cold Rolled Carbon Steel

Size Range, in. diam.	B. W. Gage	Flash Controlled (to 0.005 in. max.) OD, ±	ID, ±
¼ to ⅜ Inc.	22–14	0.0025	0.009
Over ⅜ to ⅝ Inc.	22–16	0.003	0.005
Over ⅜ to ⅝ Inc.	14–12	0.003	0.009
Over ⅝ to 1⅛ Inc.	22–14	0.0035	0.005
Over ⅝ to 1⅛ Inc.	13–11	0.0035	0.008
Over 1⅛ to 2 Inc.	22–14	0.005	0.006
Over 2 to 2½ Inc.	13– 9	0.006	0.009
Over 2½ to 3 Inc.	20–18	0.008	0.012
Over 2½ to 3 Inc.	16– 9	0.008	0.010
Over 3 to 3½ Inc.	20– 9	0.009	0.012
Over 3½ to 4 Inc.	20– 8	0.010	0.015
Over 4 to 5 Inc.	16–14	0.020	0.020
Over 4 to 5 Inc.	13– 8	0.015	0.018

Hot Rolled Carbon Steel

Size Range, in. diam.	B. W. Gage	Flash Controlled (to 0.005 in. max.) OD, ±	ID, ±
¾ to 1⅛ Inc.	16–11	0.0035	0.012
Over 1⅛ to 2 Inc.	16–14	0.005	0.010
Over 1⅛ to 2 Inc.	13– 7	0.005	0.015
Over 2 to 2½ Inc.	16–14	0.006	0.012
Over 2 to 2½ Inc.	13– 6	0.006	0.016
Over 2½ to 3 Inc.	16–14	0.008	0.012
Over 2½ to 3 Inc.	13– 4	0.008	0.016
Over 3 to 3½ Inc.	16–14	0.009	0.015
Over 3 to 3½ Inc.	13– 4	0.009	0.020
Over 3½ to 4 Inc.	16–14	0.010	0.017
Over 3½ to 4 Inc.	13– 4	0.010	0.021
Over 4 to 5 Inc.	16–14	0.020	0.022
Over 4 to 5 Inc.	13– 4	0.015	0.026

Stainless Steel

Size Range, in. diam.	Flash Controlled (to 0.005 in. max.) OD, ±	ID, ±
Up to 3/32 OD exclusive	0.001	0.0015
3/32 to 3/16 OD exclusive	0.0015	0.001
3/16 to ½ OD exclusive	0.003	0.005
½ to 1 OD exclusive	0.004	0.006
1 to 1½ OD exclusive	0.005	0.007
1½ to 2 OD exclusive	0.006	0.008
2 to 2½ OD exclusive	0.007	0.010
2½ to 3½ OD exclusive	0.010	0.014
3½ to 5 OD exclusive	0.015	0.020

from wrinkle shadows; whenever possible, stay within the limits listed in Table 3. These specifications are set up to produce wrinkle-free bends.

Departure Hikes Cost—Smaller radii can be supplied, but without real assurance that the tube will be wrinkle-free on the inside of the bend. Any deviation from these standard specs increases the cost of the part in production, as well as the cost of the tools.

Minimum distance between mandrel bends is 2 x OD if in the same plane, and 2½ x OD if in different planes. To maintain a true tube-end diameter, the distance between the theoretical end of the bend and the end of the tube should be 2 x OD.

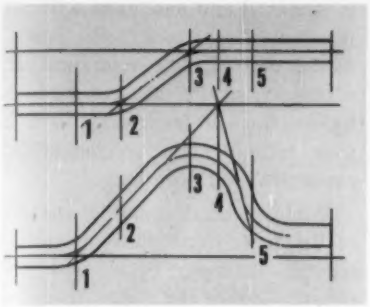
Some wall displacement occurs in all bending of tubular products. It's most noticeable in mandrel bending when an attempt is made to eliminate wrinkles. The amount of displacement will vary, depending on equipment used, chemistry and physical properties of the tube involved.

For Flat-Sided Tubes—Bending of square and rectangular tubing is done mostly by the mandrel bend method. These types of tubing are hard to bend without a mandrel because tube walls have a tendency to collapse during bending.

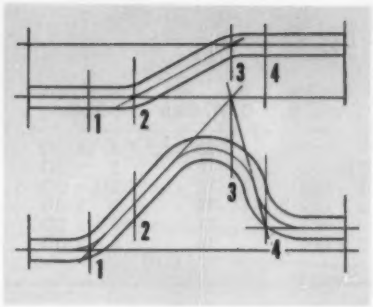
Table 4 can be used as a guide to the minimum center line radius on which a square or rectangular tube can be bent without wrinkling. Wrinkle-free bends with smaller radii than any shown in the table can be made, but special tooling is required.

Planning the Layout — Again, keep in mind the fact that metal stretches in bending; it's impossible to have a square end on a tube if the bend is too close to the end. To maintain true tube diameter at the ends and eliminate unnecessary trimming operations or scrap, the distance between the theoretical end of the bend and the end of the tube should be 2 x OD.

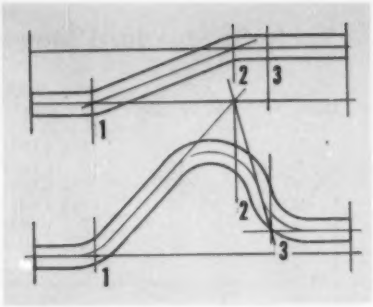
To find whether or not desired



POOR: Bend within a bend calls for rebending an already bent tube; it won't prove very practical.



BETTER: Called "rocking the bend," all tangents to bends intersect the same vertical line.



BEST: This is done by adding an extra bending operation in another position and using one rock bend.

radii for various bends are practical, consult the minimum radii tables. Smaller radii than those listed may be made, but the cost due to breakage in bending is excessive. Mandrel bends will not be wrinkle-free if smaller radii are used. The contour for fabricated parts is commonly held within ±⅛ in.

All radii should be specified to the center line of the tube, not to the inside or outside of the bend. It's common practice to dimension to points of intersection of the center-line tangents of the bend.

No Bends Within Bends—In no case should a bend within a bend be specified; it isn't practical to rebend a bent tube. This refers to a vertical and horizontal bend at the same section of a part. In almost every case this can be avoided by "rocking the bend" or by using an extra bend in another position of the tube (see sketches).

Often, two radii are specified in one bend, the two bends being adjacent. This is impractical and can be avoided with one compromise radius.

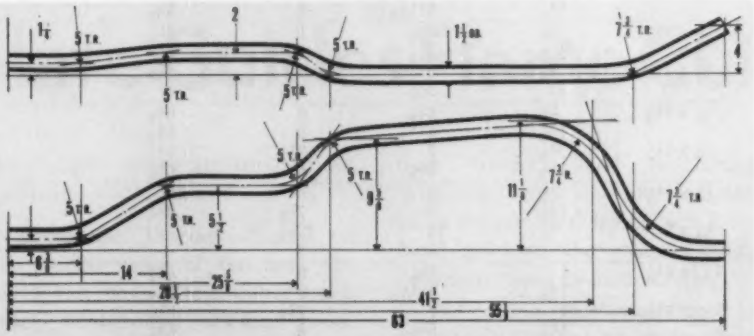
Sometimes two radii are specified with a very short straight section between, where one radius would do just as well. The two-radii job is expensive and unsatisfactory.

Consider Clamps — Clamps are often specified to be attached at bends. When allowance isn't made for distortion of the bends, the clamps may not fit properly. This is due to the slight variance of the bend, or because the shape of the tube at the bend may not be a true circle. Clamps are best attached at straight sections.

Punched holes are sometimes shown at bends. This should be avoided where possible. If holes must be located in the bent portion of the tube, use drilled holes rather than punched holes.

About Tolerances — Very close diameter tolerances are sometimes specified at ends of tubes where the bends are close to the ends. Ends can't be sized after the bends are made; once bent, metal in the tube

How to Find Developed Length



Starting at the left end of tube, the first two 5 in. radii are both about 30°; using the formula

$$L = \frac{2 \times 3.1416 \times 5 \times 30}{360} = 2.6148 \text{ in., or } 5.2296 \text{ in. length of both.}$$

The next two 5 in. radii are both about 39°

$$L = \frac{2 \times 3.1416 \times 5 \times 39}{360} = 3.403 \text{ in. or } 6.806 \text{ in. for both.}$$

The first 7¾ in. radius has a 70° bend.

$$L = \frac{2 \times 3.1416 \times 7.75 \times 70}{360} = 9.648 \text{ in.}$$

The second 7¾ in. radius has a 68° bend.

$$L = \frac{2 \times 3.1416 \times 7.75 \times 68}{360} = 9.193 \text{ in.}$$

Total developed length is determined as follows:

Total approximate developed length	= 31.2830	4th straight section	= 3.2812
1st straight section	= 5.0000	5th straight section	= 14.6250
2nd straight section	= 5.6875	6th straight section	= 1.5000
3rd straight section	= 7.4375	7th straight section	= 3.6250
		Tube total developed length	= 72.4392

Table 3: Standard Mandrel Bends

Outside Diam., in.	B. W. Gage	Min. Bend Radius	Outside Diam., in.	B. W. Gage	Min. Bend Radius
½ to ⅞	16	1½ x OD	1 to 2¼	20	3 x OD
½ to ⅞	18	2 x OD	2⅜ to 3	14	2 x OD
½ to ⅞	20	2½ x OD	2⅜ to 3	16	2½ x OD
1 to 2¼	14	1½ x OD	2⅜ to 3	18	3 x OD
1 to 2¼	16	2 x OD	3⅛ to 4	14	2½ x OD
1 to 2¼	18	2½ x OD	3⅛ to 4	16	3 x OD

Table 4—Working With Flat-Sided Tubing

Minimum Bend Radius for Square Tubing*

Size of Square	14 Gage	16 Gage	18 Gage	20 Gage
½	1⅝	1¾	1⅞	2
¾	2⅝	2 13/16	3	3⅜
1	3½	3¾	4	4½
1¼	4 11/16	5	5⅝	—
1½	5⅝	6	6¾	—
1¾	7	7⅞	8¾	—
2	8	9	10	—
2½	10	12½	—	—
3	12	15	—	—

Minimum Bend Radius for Rectangular Tubing*

Size of Rectangle	Side on which Bend Falls	14 Gage	16 Gage	18 Gage	20 Gage
½ x 1	½	3½	3¾	4	4½
	1	3½	3¾	4	4½
½ x 1¼	½	4 11/16	5	5⅝	—
	1¼	4 11/16	5	5⅝	—
½ x 1½	½	5⅝	6	6¾	—
	1½	5⅝	6	6¾	—
¾ x 1	¾	4 11/16	5	5⅝	—
	1	3½	3¾	4	—
¾ x 1¼	¾	5⅝	6	6¾	—
	1¼	4 11/16	5	5⅝	—
¾ x 1½	¾	7	7⅞	8¾	—
	1½	5⅝	6	6¾	—
¾ x 1¾	¾	8	9	10	—
	1¾	7	7⅞	8¾	—
¾ x 2	¾	10	12½	—	—
	2	8	9	—	—
1 x 1¼	1	5⅝	6	6¾	—
	1¼	4 11/16	5	5⅝	—
1 x 1½	1	7	7⅞	8¾	—
	1½	5⅝	6	6¾	—
1 x 1¾	1	8	9	10	—
	1¾	7	7⅞	8¾	—
1 x 2	1	10	12½	—	—
	2	8	9	—	—
1 x 2½	1	12	15	—	—
	2½	10	12½	—	—
1 x 3	1	16½	19¼	—	—
	3	12	15	—	—
1 x 3½	1	20	22½	—	—
	3½	16½	19¼	—	—
1¼ x 1½	1¼	7	7⅞	8¾	—
	1½	5⅝	6	6¾	—
1¼ x 1¾	1¼	8	9	10	—
	1¾	7	7⅞	8¾	—
1¼ x 2	1¼	10	12½	—	—
	2	8	9	—	—
1¼ x 2½	1¼	12	15	—	—
	2½	10	12½	—	—
1¼ x 3	1¼	16½	19¼	—	—
	3	12	15	—	—
1½ x 2	1½	10	12½	—	—
	2	8	9	—	—
1½ x 2½	1½	12	15	—	—
	2½	10	12½	—	—

* All figures are in inches.

is stretched and has taken a permanent set. Leave a straight portion at the end, if close tolerances are necessary, so the tube can be sized by swaging or broaching. In light gage tubing, close tolerances are expensive and impractical.

Where a bend comes at the end of the tube, don't show a straight section running back into the radius. Reduce the radius to correspond to the table.

Note on the drawings, wherever possible, the gaging points for sections that must be held to close tolerances. State the allowed clearances at these sections and the methods that will be followed when inspecting.

To find the approximate developed length of a tube, all developments must be taken on the centerline and on the true developed view of the section being considered. Add together all the straight section lengths and the curved section lengths. Curved sections are measured by degrees of angular bend.

Checking Bends—Because of the peculiar shapes of bent tube parts, they are at times very hard to check. To avoid confusion between manufacturer and purchaser, there should be a drawing showing the dimensions and type of gage that will be used for checking the bent parts. This drawing should indicate all gaging points and tolerances.

If the end of the tube is flanged, the drawing should show the fixture that will be used to draw the flange up to a fixed block.

To check bent tube parts by means of a paper drawing or template, a surface plate and rectangular steel block are used to line up the tube. Planner jacks or adjustable blocks are used to support the tube in the various planes so accurate measurements can be taken.

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GUIDES ON EDGE: Operator adjusts photoelectric head on edge of template. Automatic cutting cycle follows.

Paper Template Guides Flame Cut

Need a one-of-a-kind part in a hurry? Cut a simple paper template to shape and a photoelectric head takes over.

Time savings result from the quick setup and speed of flame cutting.

▪ Guiding on simply-prepared paper templates, a flame-cutting machine makes fast work of small lots. It's the answer to one company's problem in turning out one-of-a-kind special machine tools.

To cut irregular shapes, the operator of the unit at The Ingersoll Milling Machine Co., Rockford, Ill., draws the shape on a sheet of paper. He uses full scale plus one-half the diameter of the flame-cutting kerf.

A paper cutter serves to cut the straight edges of the shape. Ordinary paper shears are used to cut radii and contours.

Automatic Tracing—Placed on the tracing table of the unit, the sheet can be a white paper on a black background or vice versa. The machine's electric-eye tracing head then takes over to follow the outline.

Comparative time studies made by Ingersoll show greater than two-thirds reduction in cutting out a typical part by the flame method over former band machining. Whereas preparing the template takes longer than laying out for a band machine, the greatest saving comes in speed of flame cutting.

The cutting setup is produced by the Messer Cutting Machines, Inc., New York. It gets accuracies of ± 1/32 in. in cutting shapes up to 1½ in. thick and ± 1/16 in. for 6½ in. thickness. In cutting circular parts, a special attachment replaces the photoelectric control.

Torch Cutting Shows Time Advantage*

Torch Cut		Band Machine	
Prepare template	15.00	Layout	8.00
Position template	0.20	Load on saw	0.40
Position torch	1.60	Position and clamp	14.40
Pierce and cut	3.10	Sawing	40.90
Totals	19.90		63.70

* Time study was made on a support clamp bracket with time in minutes.

Short Arc Pinpoints Heat For Welding Sheet Metal

A stable buzzing type of arc is the focal point of a fast new way to weld thin gages.

It brings design and production advantages of welding to light sheet metal products.

▪ Weld light-gage sheet metal? A new process does the job on thicknesses of 0.030 to 0.100 in. and for stringer beads or position welding on thicker material.

It works in all positions and with all types of joints. And it works on all the common metals: carbon steel, stainless steel, and aluminum (0.040-in. minimum).

Called the Linde Sigma short-arc process, the method provides readily controlled welding at high speeds. Its main advantage is the ability to weld sheet metal in a range of thickness heretofore not considered weldable by any process: 0.030-0.040 in.

Three Key Factors—In course of development by Linde Co., Div. of Union Carbide, New York, three innovations enabled the Sigma process to extend downward in current levels for the welding of thin material. First, power supplies of the variable - slope constant - potential type are now available.

Secondly, new equipment can feed small wires. And thirdly, the selection of shielding gas controls metal deposit or weld buildup rather than wire diameter.

Normal Sigma welding has in the past involved a spray or drop-type transfer. It results in welding arcs too hot to be useful for sheet metal

Problem of Arc Outage—Even minimum useful currents would cause rapid burn through on 0.062-in. thick butt or fillet welds. Attempts to reduce welding currents and voltages result in a globular, erratic arc, producing no weld at all.

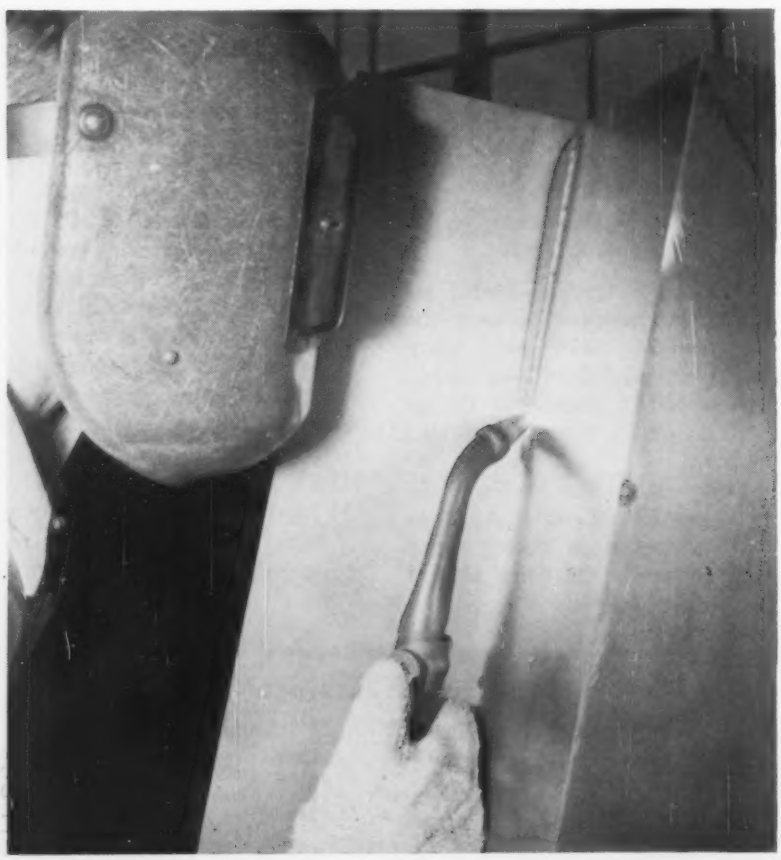
Frequently the electrode freezes to the work followed by an arc outage. Then there's usually an ejection of a length of wire creating a momentary long arc.

However, the short-arc process controls surge current to produce a stable buzzing type of arc. It limits duration of arc outages and prevents wire ejection.

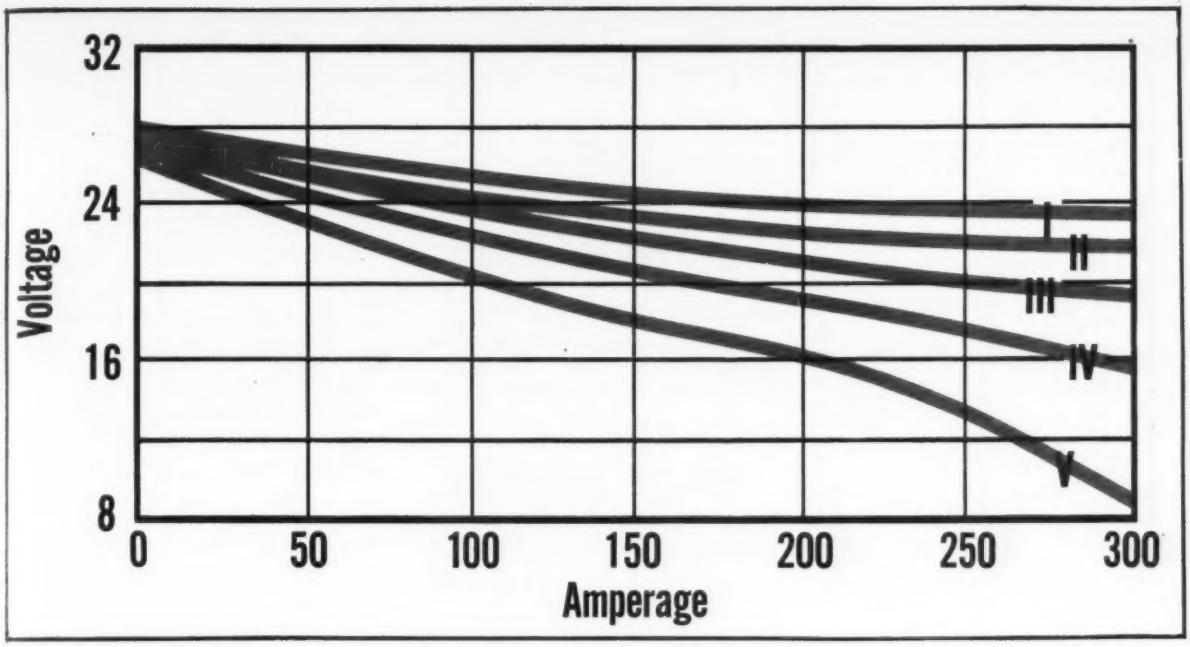
Pinpoint Heat—Operating in the range of 14 v and at 30-125 amp, the arc short circuits dozens of times per second and produces a small cold puddle pinpointing the location of arc heat. The low heat-speed ratio holds distortion of sheet metal to a minimum.

The unit uses primarily 0.030-in. diam wire, although 0.020-in. diam hard wire works well on material in the low end of the thickness range. The continuously-fed electrode provides high arc duty cycles for more welds per day.

Study Shielding — For stainless steel and carbon steel, argon-oxygen and argon-carbon dioxide mixtures find wide acceptance. Pure carbon



VERTICAL RUN: Operator uses ST-2 torch with 0.030-in. diam Oxweld 65 wire on 15-gage carbon steel. Shielding is 7.5 cfh argon and 2.5 cfh CO_2.



VOLT/AMPERE CURVES: Power supply for short-arc process has constant potential with controllable slope. Curves are for 300-40 low-range maximum open circuit voltage with suitable drooping characteristics.

dioxide produces more spatter and poorer bead formation, and weld costs are about the same as when the mixture is used. It's true because less wire can be used with the mixture.

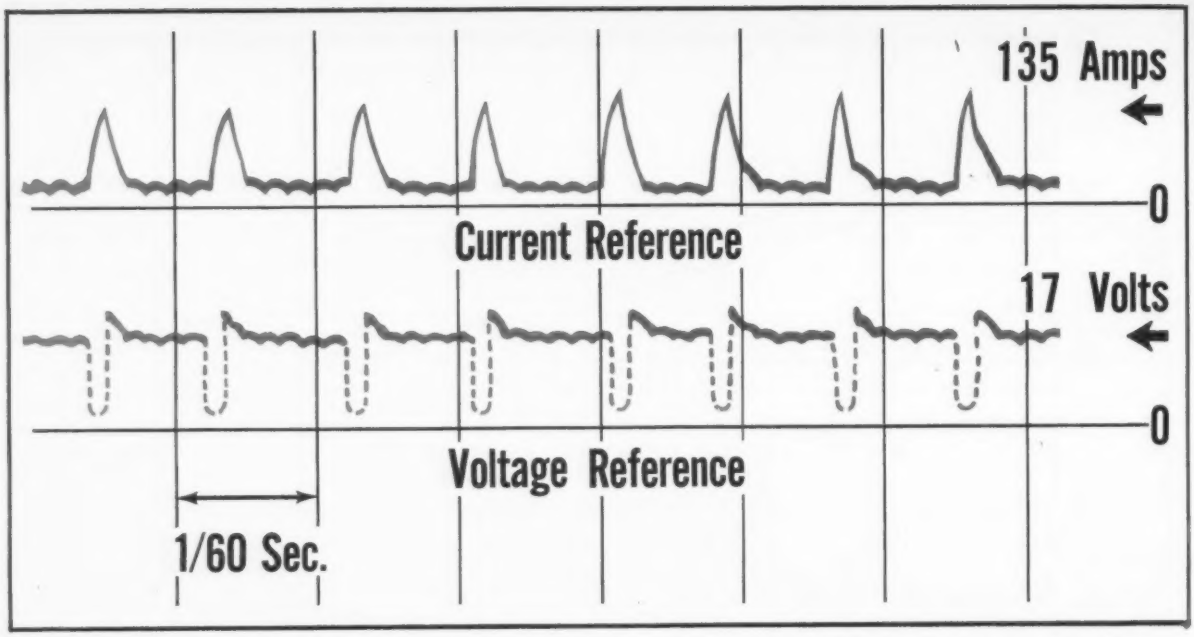
Argon-carbon dioxide mixtures provide many advantages over either argon or straight carbon dioxide on carbon steel. For example, they permit fillet welds with a minimum of deposited metal. Superior wetting action results in improved bead contour.

These mixtures can be obtained by regulating both gases through commercial flow meters and joining them in a simple "Y" connection. Suitable spuds alter the Linde Gas Proportioner for low flow rates.

How Wire Size Affects—In controlling weld build-up, it's a common error to assume that a smaller wire produces a smaller weld reinforcement. Actually the reverse is quite true. At a given current a smaller wire has a much greater rather than less metal deposit rate.

With stainless steel wire at 70 amps, 22 v, for example, the rates are as follows: wire with 0.030-in. diam deposits at 1.6 lb per hour;

SETTING UP: Welder adjusts setting on constant potential power supply. On top is mounted a Linde SWM-2 control and drive unit.



SHORT-ARC CYCLE: Typical oscillograph shows arc shorting out and reestablishing in uniform pattern. The recording meter indicated a 15-v arc and 55 amp DCRP. Control of surge current produces a stable arc.

0.020-in. diam at 2.4 lb per hour, and 0.015-in. at 3.6 lb per hour.

This higher deposition rate of the smaller wires may be an advantage for filling gaps. The smaller wires also enable the welding of thinner materials at lower currents. The combination of smaller wire and lower current, however, cannot in turn be used to weld heavier material in the hopes of producing less metal build-up.

Gas Controls Deposit—One factor that does have a marked effect on metal build-up is the choice of shielding gas. For instance, the use of argon-carbon dioxide, as opposed to straight carbon dioxide, halves the amount of metal deposited in fillet welds. Fillet is also half size.

Two factors make this possible. First, the mixture provides a higher heat allowing a given welding job to be done with a lower current and a lower metal deposition rate per foot of weld.

Secondly, it provides better wetting action to get high welding speed which also reduces weld build-up. Both these factors combine to produce the maximum footage of weld per pound of metal.

Smaller Wire Size Boosts Deposit Rate

Stainless Steel Wire at 70 amp DCRP, 22 v	
Wire Diameter in.	Deposit Rate lb/hr
0.015	3.6
0.020	2.4
0.030	1.6

Select Torches—There's a selection of equipment suitable for short-arc welding. The Linde ST-2 torch takes hard wires and the revised HW-11 is used for soft wires. Both units feed from the Linde SWM-2 control and drive unit. The HW-16 and HW-13 torches are suitable for mechanized welding.

The ST-2 torch has the advantage of lightness. The revised HW-11 for feeding 0.030-in. aluminum wire provides a suitable unit for manual welding of thin aluminum. Both are designed for spray arc as well as short-arc operation.

The power supplies, mentioned above as vital to the process, incorporate the proper drooping characteristic. Among those who manufacture suitable units are: Metal & Thermit, P & H, and Miller.

Aid To Industry — Short-arc welding can be applied wherever sheet metal is fabricated. A company in Indianapolis is using 10 ST-2 torches for the welding of automotive bodies. Other applications include steel and aluminum capacitor cans, steel cabinets, steel furnaces, and jet engine parts.

The Philadelphia Naval Shipyard approves the use of the Linde SWM-7 control with the conversion kit for 0.030-in. diam aluminum wire for Navy work. Sample welds on aluminum boats, made with the 0.030-in. kit, look very promising.

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Speedy Presses Win Key Role In Jet Engine Production

There are many ways to put a lot of holes in metal parts. Here's a case for the speedy punch-press method.

▪ Punch presses and precision dies are changing a lot of jet engine production methods at Pratt & Whitney Aircraft. They're taking over many jobs once handled on drilling and milling machines.

Here's an example: A few months ago it took 87.2 minutes to drill 72 holes in the periphery of a J-57 compressor bearing support. Today, a punch press pierces all 72 holes in one operation. Since it now takes only 1.5 minutes, there's a clear saving of 85.7 minutes— 98 pct on each part.

Better Job—Here's another example: A J-57 turbine vane locating lug was formerly milled, drilled and deburred in a 3.52-minute cycle. Now, in one 0.634-minute operation, a punch press pierces all the required openings and still yields a better workpiece. Here the time saving adds up to 82 pct. On other jobs switched to presses, savings in time range from 20 to 75 pct.

The hope of saving such big chunks of time wasn't the chief reason why P & W engineers looked into punch presses. Their original problem was a twin one involving part size and production schedules. Some jet engine parts measure 4 ft in diam. To make the required number of these on regular drilling and milling machines, the company would have had to buy more big machines and add more floor space.

Best Solution — Punch presses seemed to be the answer to this space-and-scheduling problem. And so they proved to be, not only for the time they saved, but for the other benefits they provided.

For example, the presses do top-quality work. This means less scrap and a sharp drop in inspection costs. Moreover, punched holes need little or no deburring. Formerly, getting rid of burrs often took more time than the actual machining cycles that caused them.

Press tools also wear longer than regular drills and milling cutters.

IN ONE STROKE: Punch press pierces all 72 holes in periphery of bearing-support workpiece, saving 85.7 minutes over former drilling time.

Compact Furnace Anneals Strip

By **D. L. Somers,** Mech. Supt., Somers Brass Co., Waterbury, Conn. and **C. A. Turner,** Chief Metallurgist, Selas Corp. of America, Dresher, Pa.

Providing controlled atmosphere and temperatures up to 2100°F, a new furnace produces quality stainless strip.

Hanging vertically, the strip heats and cools without ever touching a roll surface.

▪ A new continuous annealing technique is helping to meet the growing demand for wide stainless steel strip and other refractory-type alloys. The installation is now on operation at Somers Brass Co., Waterbury, Conn., a leading producer of thin stainless strip.

The company is teaming the annealing line with their Sendzimir mill in the production of strip up to 25 in. wide and as thin as 0.001 in. Previous annealing equipment consisted of muffle-type, horizontal furnaces not able to handle wider material.

Main Objectives — In choosing new equipment, they set three goals. They wanted a compact furnace because floor space was at a premium. They wanted uniform heating along with long muffle life and ease of muffle replacement. They wanted top strip quality in terms of flatness, microstructure, mechanical properties, and surface condition.

To meet all of these objectives, the company tried a new approach. They asked Selas Corporation of America, Dresher, Pa., to design and build a special vertical furnace for continuous annealing. In production since last July, the furnace has been delivering stainless strip that is clean, bright, and free of contamination.

More Versatile—The furnace is designed for a maximum strip speed of 50 fpm. It can handle strip 0.001 to 0.020 in. thick and 8 to 26 in. wide. The maximum muffle temperature is 2100°F.

The muffle (6 x 36 in. in cross-section) is arranged in the shape of an inverted U. The vertical lengths are 5½ ft apart and the horizontal cross-over is located about 27 ft above the floor level.

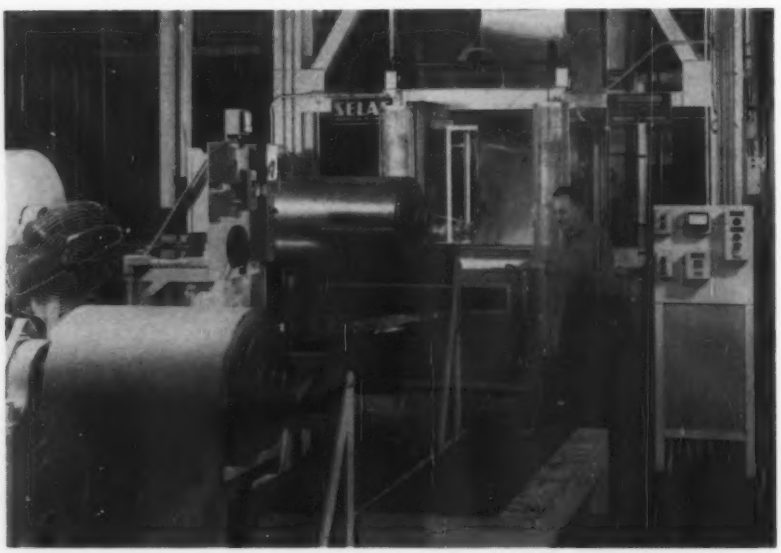
This arrangement has important advantages over horizontal muffles for processing strip of comparable width. It requires less muffle material and extends muffle life. Also, it provides more uniform strip temperature and improved atmosphere purging.

Saves Space — To account for these improvements, horizontal muffles for handling a comparable strip width would have to be of circular cross-section to provide maximum structural strength. This shape would require about 35 pct more material than is needed for the rectangular-shaped vertical muffle.

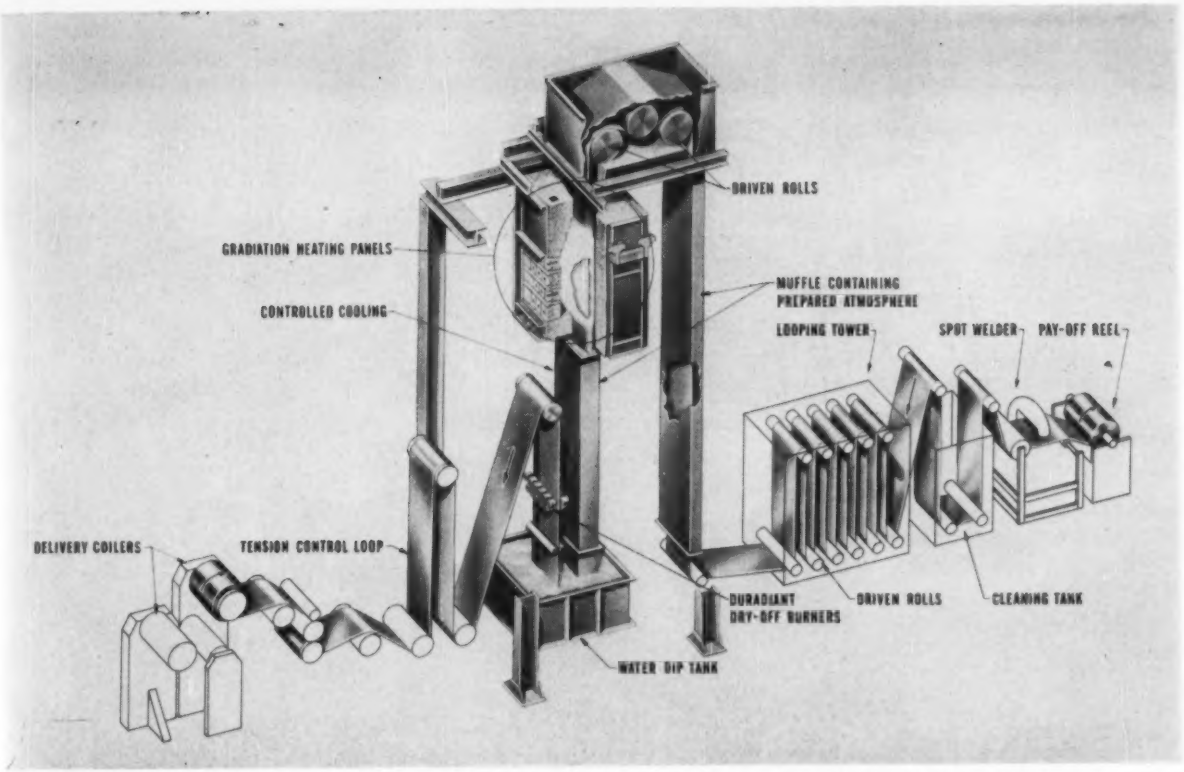
Another point: uniform strip temperature can be achieved only if temperature is uniform throughout the muffle. In the rectangular-shaped vertical muffle, the strip is equidistant from the radiating muffle-wall over its entire width. This feature, coupled with the Gradiation method of uniform muffle heating, assures uniform temperature across the strip width.

Controls Atmosphere—This vertical muffle also promotes improved flow of atmosphere gas over all portions of the strip surface. It eliminates formation of stagnant pockets or stratification. The furnace muffle is a high-alloy, heat-resistant metal. The section above and below the furnace is made of 18-8. The inlet leg, which is not subjected to heat, is regular carbon steel sheet.

The new furnace consists of two opposing burner panels, located 9 in. from either side of the muffle. Each panel (about 40 in. square) contains burners patterned in four horizontal rows. The burners are fired by premixed gas and air. Com-



SPACE SAVER: Total strip line length is only 50 ft. Heating and cooling operations require only 10 ft of floor space, 21 ft vertical travel.



UP AND OVER: Vertical design saves valuable plant space, includes controlled atmosphere protection.

bustion takes place within the burner cup.

Heats Efficiently—Heat is transfered mostly by radiation. Flame beyond the cup surface is avoided. The heating chamber proper is approximately 6 ft long. The burners are fed a gas-air mixture from a special Selas controller installation. This premixes to a desired ratio and pressure, feeds through a single pipe system to the burners.

The furnace is constructed in two sections, split vertically and suspended from trolleys for retraction. The furnace muffle is easy to get at for repair or replacement. All parts of the system are equipped with safety controls.

Positive Pressures — The complete muffle system is supplied with dissociated ammonia. The gas enters through inlets to both vertical sections and to the top cross-over section. Seals at the bottom of the vertical sections help prevent air infiltration at the entry side and steam infiltration at the discharge side. Any steam rising above the outlet seal is purged out through bleed lines.

Atmosphere gas is supplied to the muffle at flow rates (1000-1500 cfh) sufficient to maintain a positive pressure in the system. Periodic analyses of the atmosphere are made by drawing the gas from the muffle through a glass sampling tube. Inside the tube, it passes over the surface of an electric-resistance heated strip coupon.

Welds First—In production annealing, the cold-reduced, stainless coil is placed on the uncoiler stand at the head of the line. In the case of start-up, it is spotwelded to an Inconel stringer. In continuous operations, it is spotted to the preceding coil. Beyond the weld station, the strip passes through a cleaning tank for removing rolling oil.

It then enters the looping tower. A minimum of about 95 seconds is allowed for making a weld on the thinnest strip without stopping strip travel through the furnace.

Next, the strip enters one vertical leg of the muffle just above floor level, passes over the top rolls and is heated in the first few feet of downward travel. Leaving the furnace portion of the muffle, the strip continues its vertical descent through a cooling duct extending to a waterquench bath.

Water Quenched—The strip enters the quench at temperatures below 600°F. In ascending vertically from the quench, water is almost completely removed by passage between a pair of squeegee rolls. Final traces of moisture are removed as the strip passes through an open setting of opposing burners. A dancer roll controls strip tension.

The strip then passes through a combination bridle and pinch roll which provides drive at the back of the line. From here, the strip is fed to one of two coilers. The top three rolls of the furnace section are driven and synchronized with the bridle roll.

UNLIMITED VARIETY: Modern plant equipment uses many types and sizes of bearings. In these quantities, some duplication is bound to occur. Integrating bearing stocks will result in big savings in inventories.

Do You Need All Those Bearings?

By **W. J. Scully**—Vice Pres. in Charge of Sales, Bearings, Inc., Cleveland

To adapt a familiar phrase: "A bearing by any other number may still be the same." A cross check of your inventory may turn up a lot of duplications you don't really need.

▪ It's costly and unnecessary to carry a lot of duplicate bearing types and sizes in replacement stocks for various items of equipment. Unknowingly, many plants do just this.

Here's how the situation usually develops: Plant "A" has 60 electric motors of all types and sizes. They were built by 10 or more different manufacturers, let's say. If Plant "A" wants to stock a spare set of bearings for each motor, it will have an investment in 120 bearings.

A bearing survey may show that many of these 60 sets are really identical, even though they carry different part numbers assigned by the motor manufacturers. Discovering these duplications and reducing the inventory accordingly is a worthwhile savings step for any plant to take.

Means Big Money — Several years ago, the 44 branch offices of Bearings, Inc., started making comprehensive bearing surveys as a customer service. One such study brought a steel company inventory savings of $2000 in less than two months. Another caused a coal company to reorganize its entire setup for buying bearings.

The end result of a survey should be a catalog listing all the bearings in a plant. Each should be identified therein according to: (1) the item of plant equipment it's used on, (2) the equipment maker's bearing number, (3) the original

bearing manufacturer's number, (4) numbers of other makes of bearings that are interchangeable with it.

Points Out Waste—One survey made by Bearings, Inc., produced a looseleaf catalog of more than 200 pages for The Ashland Oil & Refining Co., Canton, O. The study showed, for example, that the oil company had been stocking replacement bearings for eight different pumps in as many separate bins. Why? Simply because the bearings bore different part numbers. In reality, all the bearings were interchangeable.

Ashland Oil noted the duplication and reduced its inventory of pump bearings by 12 units. At $7.65 per bearing, this one saving ran to about $100. Multiplying this situation throughout the plant runs into big money.

Not every bearing survey is made in the same way. Actually, the plant involved calls the tune.

Various Preferences—Some companies want the survey catalog made up according to part numbers; others prefer it to be based on location of machines in the plant; still others want it compiled by equipment types, with all lathes in one section, all milling machines in another, and so on.

Each plant has its own problems and operating procedures that the survey catalog should tie-in with. All, however, have a common goal: The desire to save by reducing inventories.

Essentially, then, these are the benefits you get from a bearing survey: (1) reduced inventory as a result of weeding out duplications. (2) less downtime when bearings need to be replaced.

Moreover, your bearing distributor will be alerted to your needs. He will be able to keep in his inventory the right bearings to service your plant requirements. His stock will be in no danger of improper handling, nor will it be exposed to dirt and grime. You need only keep a minimum stock on hand.

How to Make a Survey

1. Investigate machines when it won't interfere with production, say on weekends or holidays.

2. Wherever possible, work with maintenance and repair manuals and parts lists to find out where bearings are, and their numbers. If you have to take the machine down, lay the bearings out on clean paper. Keep hands free from dirt.

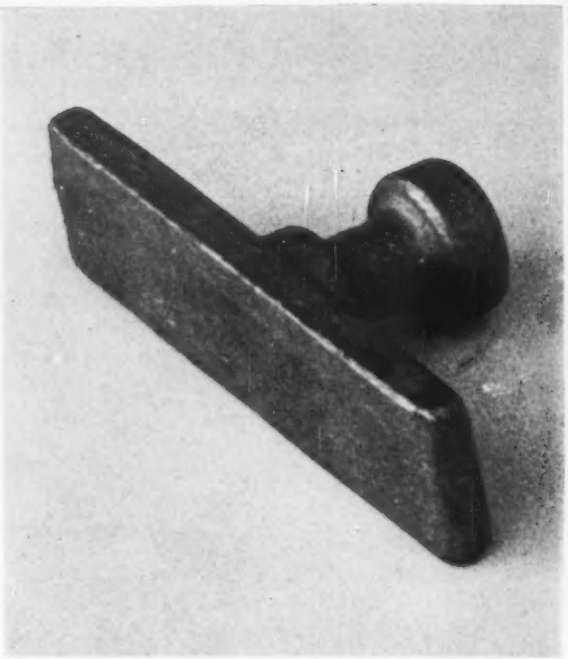
3. When you have your data, re-oil or re-grease bearings before you put them back in the machine.

4. Check your bearing stocks. List them by make, quantity of each, bearing number, and machine(s) they're intended for.

5. Make all your records available to your authorized bearing distributor. He will cross-reference your information with his own and prepare full interchange information. He will also supply you with a survey catalog listing all your bearings.

GOOD SYSTEM: A thorough survey will check every bearing in the plant, reveal duplications in replacement stocks, point out potential savings.

STRAIGHT SIDES: Hammer die extrudes tubular portion. Succeeding steps remove taper.



USE BASE AS IS: Flat base needs only a light grind. If forged with draft, base would have to be machined.

Erase Draft While Forging To Save Machining Steps

By Herbert Chase—Consultant, Forest Hills, New York

Even if it takes extra steps in the forging shop, elimination of draft can sidestep expensive machining later on.

Many designs can be handled by this no-draft method.

▪ Drop forgings produced in hammer and press dies usually must have draft. The minimum preferred is about 3° and the average about 7°-10°.

Without draft, the pressure applied in forging forces metal into die cavities and around projections. Draft eases the job of extracting the forging from the die.

How to Eliminate—But it does not follow that drop forgings must have draft in delivered form. By splitting the die in a plane parallel to punch motion, the forging may free itself when the die opens.

Also coining (hot or cold) or shearing in a trim die can remove draft. Even when such steps are taken at extra cost, they often can effect a net saving to the customer. Subsequent machine work can be reduced or even eliminated. In many cases, there's a saving in material, adding further to net economy.

Check with Forger — When a purchaser of forgings sees potential savings by having certain forgings free of draft, it may pay him to know what a forger can do. Here's how Endicott Forging & Mfg. Co., Inc., Endicott, N. Y., has benefitted customers by producing forgings without draft in critical places.

In the case of a stainless impeller, the blades clear the die readily when made. It was specified, however, that the D-shaped central hole in the hub should have no draft and yet be held to ± 0.010 in.

By punching out the hole with the forging still hot, it's easy to hold the limits specified. The customer doesn't have to machine a D-shaped section in the hard-to-machine stainless steel.

FORCE UNDERCUT: Header punch removes taper on face and forces metal inwardly to produce undercut.

READY FOR WELDING: Beveled and formed to fit transverse tube, end of tube needs no flame cutting.

Punch Die Does Job—For a heavy-wall saucer-shaped forging, no draft is specified inside or outside. It's made from SAE 1020 steel, serving as an axle end cap.

As forged, the piece has a draft of about 7° to keep the forging from sticking in one or the other half of the die. Forging produces flash at the outside diameter of the open end.

After a trim die removes the flash, the forging goes through a punch die to hold a 6 13/16 in. diam. In so doing, the forging sides contract to eliminate the draft.

On the return stroke, the forging is stripped off the punch. Elimination of draft helps reduce machining and waste of metal.

How To Handle Undercuts—Cupped-end forgings with an undercut usually require considerable machining. In one case, however, the undercut results directly from forging. The closing in of the open end by forging greatly reduces the amount of machining.

An upsetter forges this piece from a 2⅛-in. hot-rolled round bar of SAE 8620 alloy steel. The shank can be of any length.

Initial upsetting gathers metal at the large end. Subsequent upsetting requires a punch that shapes the interior, but without forming any undercut. Naturally, a necked punch could not be extracted if metal was forced into the neck.

Accordingly, the punch forms an outward taper in the recess next to the open end. In addition, the header-die impression is shaped to form a taper on the face.

Header Forces Undercut—Then the forging is placed in another cavity of the split die. The mating header punch advances to remove the taper left on the face and force metal inwardly to produce the undercut.

Some saving of metal results from the undercut, but the major benefit is avoidance of deep cuts in machining the interior spherical surface.

Brackets, with necked projections tilted at 80° to a base flange, engage fittings on safety belts worn by men who wash windows on tall buildings. The parts are forgings made from 304 stainless steel.

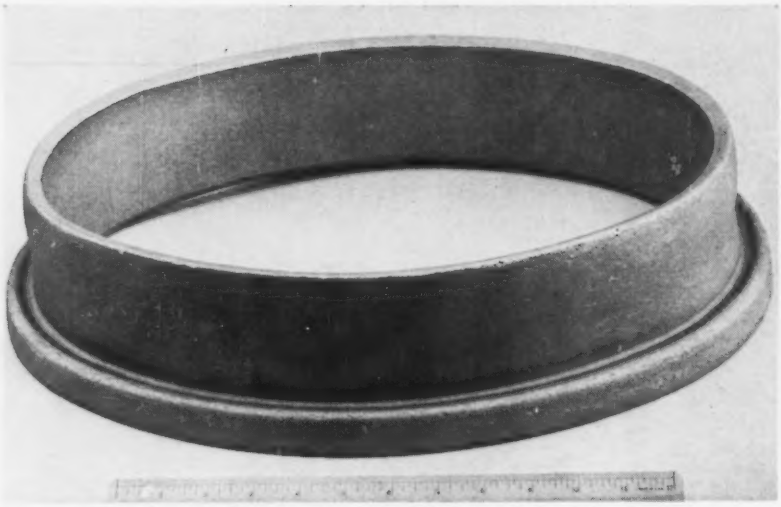
Installed, the base flange has to be bolted to a flat surface and must be flat itself. If forged with draft, the base would have to be machined.

Forge Flat Bottom—To avoid this and also to clear the neck, the die has an irregular parting in more than one plane. The flange is placed so that there is no draft on the bottom and only a slight draft on the top face.

Flash left at the parting is sheared off in a trim die. A light disk grind makes the flange bottom perfectly flat. Drilling and spot facing of holes is the only other machining needed.

Tubular parts with heavy flat-faced flanges for welding to mating parts are forged with a special form of hammer die. Four such parts have holes ranging from 1.6- to 6-in. diam.

Punch While Hot—Although the die projection produces a hole with some draft in forging, this draft is removed by a punch die while the



UNIFORM WALLS: Punch extrudes wall of manhole collar to height of 3¼ in. removing draft both inside and out. Recess forms seat for clamps.

DRAFT-FREE HOLE: Punching through D-shaped hole while forging is still hot saves customer from machining hub of stainless impeller.

forging is still hot. The punch produces a hole of close dimensions throughout its length.

Somewhat similar is a forging with the tubular portion having a uniform wall thickness throughout its length, save at the fillets. This forging is produced in a header from solid bar stock, the die having two cavities that are split axially.

In the first operation, the header die upsets the bar, producing a flange with 5° taper. Next, the header punch is forced through the flange and into the bar, producing the hole and extruding the tubular portion and giving it a square end. Flash produced at the flange is trimmed off.

Wide Design Range — Similar forgings can have thinner or thicker tubular walls and flanges of any thickness. Such parts are well adapted for welding to mating surfaces.

In one case, the outer end of the tubular portion is beveled and formed to a radius to fit a transverse tube to which this end is to be welded. If it weren't forged to this shape, it would have to be machined or flame cut. Such forgings can be produced readily in carbon, stainless and alloy steels, in a wide range of sizes.

Many large containers have manhole fittings welded to the container wall. Such fittings can be cut from two or more pieces of plate formed to shape and joined by welding, but at high cost.

Use Hammer Die—Endicott now produces such fittings in a hammer die. Forgings can be circular or elliptical, the latter shape having been made in 12 x 16-in. and 14 x 18-in. sizes.

With the heated blank placed in the forging die in a hammer, the die forms the flanged portion and also produces a cup-shaped wall. In the case of one forging, the flange is quite thick and is given a 7° draft.

A filleted recess also is formed on the outer face of the flange next to the tubular portion. This recess forms the seat for C-shaped clamps by which the manhole collar is clamped to the cover or lid.

Punch Extrudes Wall—In a final operation, a punch is forced through the inside of the cup shaped portion. This extrudes the wall and eliminates the draft inside and outside. This forging has overall height of 3¼ in., but longer tubular portions are possible.

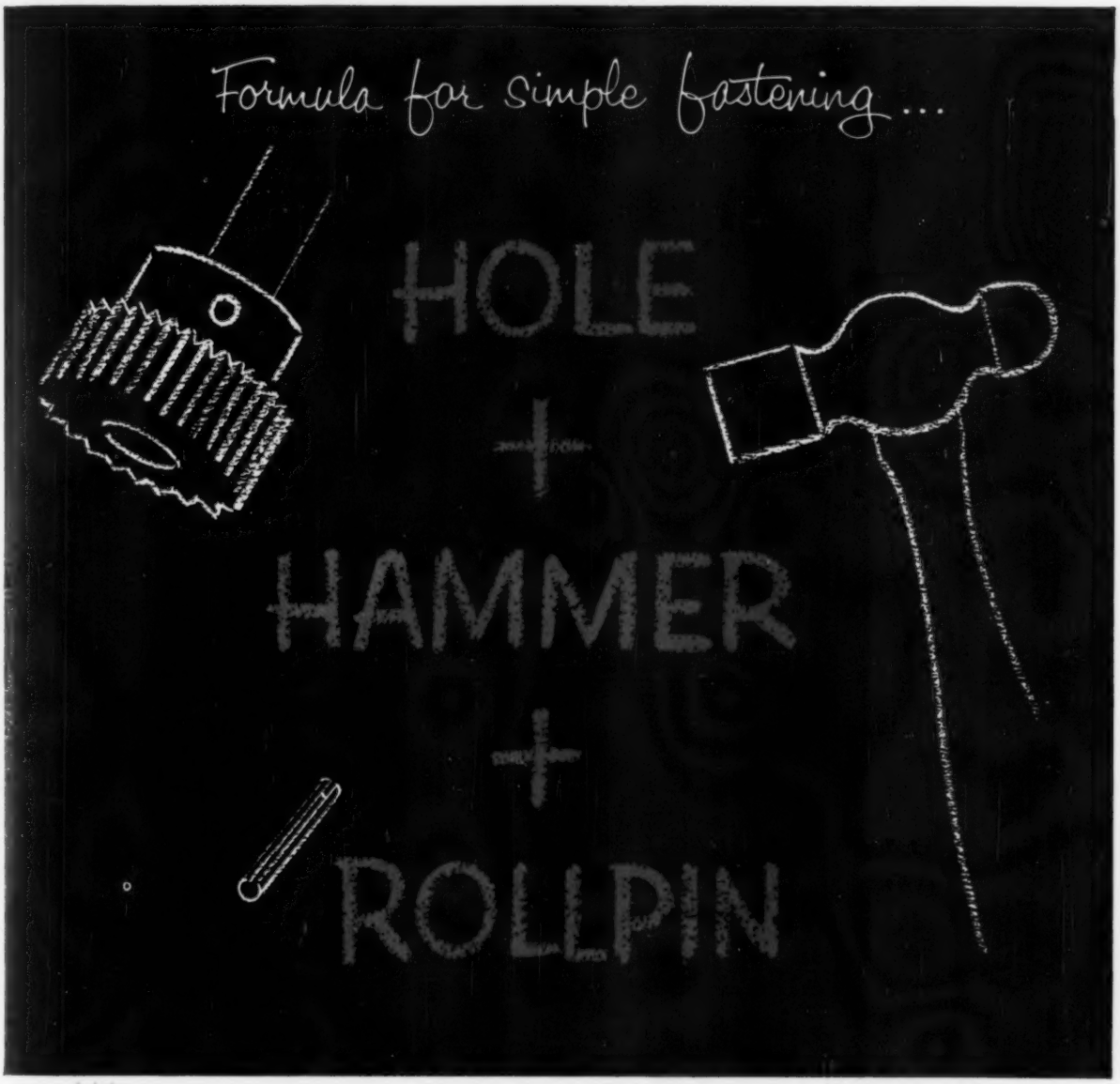
Cups of circular section can be forged on a hammer with side walls of substantially uniform thickness, without internal or external draft. Forgings of this type are similar to drawn cups, but are produced on a hammer rather than on a press.

Thickness of side wall need not be the same as that of the bottom. Moreover, with either a recess or a hub on the bottom, the wall thickness at the junction of wall and bottom can be increased to strengthen the piece.

Parallel Gear Teeth — Forgings without draft go beyond circular parts. Take the example of spur gears having coarse teeth without draft on the teeth.

In this case, the gear is forged integrally with its shaft. After pointing in the first die impression, a second impression forms the teeth, with draft each way from the gear's central plane, in which the die is parted.

A trim die, made to gear contour, removes the flash formed at this parting. The die not only shears the flash but also removes the draft. The customer gets a forging with all tooth elements parallel to axis.



If you use locating dowels, hinge pins, rivets, set screws . . . or straight, knurled, tapered or cotter-type pins—you should look into the savings in time and money offered by the Rollpin formula. **(1)** You start with a straight production-drilled hole—no threading, peening or precision drilling is needed. (For example: permissible and typical hole tolerances for effective Rollpin installation are .125-.129 for the ⅛" diameter pin; .250-.256 for the ¼" pin.) **(2)** You need no more than a hammer . . . simply modified hand tooling, arbor press or hydraulic press to set the Rollpin into a secure, vibration-proof fit. **(3)** You just drive the Rollpin into the hole . . . and that's it. Spring action locks the Rollpin in place . . . regardless of impact loading, stress reversals or severe vibration. Yet it is easily drifted out . . . and can be reused in the same hole. For information on how Rollpin can simplify your fastening jobs, fill in and mail coupon below.

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FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 109.

Cutting Tools

Two catalogs show a large selection of carbide cutting tools, blanks and inserts. (Wendt-Sonis Co.)

For free copy circle No. 1 on postcard, p. 109

Leveling Ramp

A dock leveling ramp covered in a bulletin always returns, instantly, automatically, to a locked horizontal position after each use. (Globe Hoist Co.)

For free copy circle No. 2 on postcard, p. 109

Missile Parts

Facilities for forging or stamping parts for missiles and rockets are described in a 6-page folder. (Transue & Williams Steel Forging Corp.)

For free copy circle No. 3 on postcard, p. 109

Spectrophotometers

Double - beam ratio recording spectrophotometers are illustrated in a 12-page brochure. (Beckman/Scientific and Process Instruments Div.)

For free copy circle No. 4 on postcard, p. 109

Storage Racks

Standard size adjustable storage racks are announced in a folder. Of standard dimensions, they adapt to almost any size or weight. Shelves have to 5000-lb capacity. (Palmer-Shile Co.)

For free copy circle No. 5 on postcard, p. 109

Heat Treating

Now available is a chart which relates application requirements directly to furnace and atmosphere equipment. It lists all major heat treating categories: annealing, brazing, carbonitriding, carburizing, enameling, hardening, normalizing, etc. (C. I. Hayes, Inc.)

For free copy circle No. 6 on postcard, p. 109

Batteries

Storage batteries in a new line boost the work capacity of present-day electric industrial trucks by 44 pct. So points out a bulletin. (Electric Storage Battery Co.)

For free copy circle No. 7 on postcard, p. 109

Electron Microscope

Questions and answers about electron microscopes are given in a 12-page booklet. (Philips Electronics, Inc.)

For free copy circle No. 8 on postcard, p. 109

Pouring Practice

An 8-page bulletin is designed to assist steel plants in improving pouring practice on the pit side. (Vesuvius Crucible Co.)

For free copy circle No. 9 on postcard, p. 109

Cast Alloys

A new chart lists 55 widely used cast alloys in the carbon, low alloy and stainless steel groups; also

nickel and monel. It covers design applications of each steel alloy. (Lebanon Steel Foundry.)

For free copy circle No. 10 on postcard, p. 109

Instrumentation

Potentiometer and bridge instruments in indicating, recording and controlling units are described in a 64-page catalog. It includes information on new rack mounting, high-speed, multi-point, miniature, and standard round-chart and strip-chart instruments. (The Bristol Co.)

For free copy circle No. 11 on postcard, p. 109

Cutting Fluid

Entirely new, a solution cutting fluid can replace cutting oils on heavy duty operations. So states a 12-page brochure. (Cincinnati Milling Machine Co.)

For free copy circle No. 12 on postcard, p. 109

Valves

A 20-page catalog contains three sections on valves. Each covers valves according to the type medium used: oil, water, or air. (Barksdale Valves).

For free copy circle No. 13 on postcard, p. 109

Hoists, Cranes

Motor-operated hoists, hand hoists, jib cranes, hand-traveling cranes and motor-driven cranes appear in an 8-page bulletin. (Wright Hoist Div., American Chain & Cable Co., Inc.)

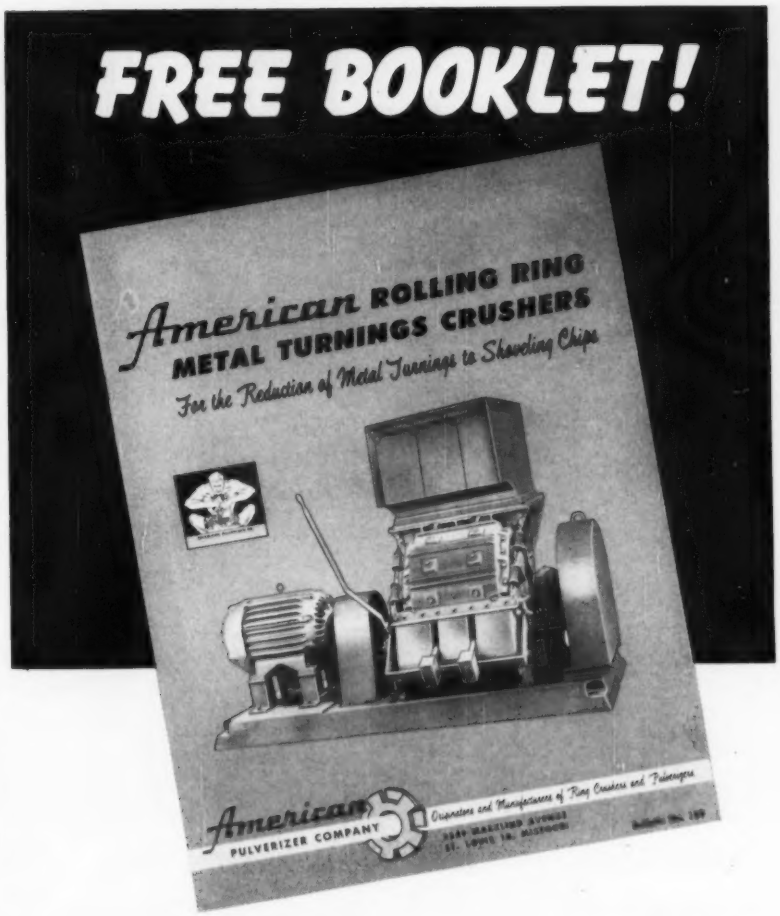
For free copy circle No. 14 on postcard, p. 109

Cobalt

"Cobalt" is a new quarterly journal on the varied uses of cobalt and its alloy. (For free copy write on company letterhead to Cobalt Information Center, Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio.)

Repair Parts

A 24-page booklet tells how to make your own machine and repair parts quicker, easier. It's designed to help solve maintenance part problems. Also covered are possible benefits of a high strength all-



How you can turn METAL TURNINGS into additional PROFIT

If your plant has 20 tons or more metal turnings per month, this booklet will tell you how you can make a substantial yearly profit.

Metal turnings reduced to shoveling chips in an American Metal Turnings Crusher command $2 to $4 more per ton on the scrap market. In addition, you save 75% of storage space and recover 30-50 gallons more cutting oil per ton of turnings.

This booklet shows all models of American Metal Turnings Crushers with capacities from 2 to 50 TPH as well as installations showing conveyor systems, crushers and chip wringers.

Write today for Bulletin 159. It will pay you to have an American Metal Turnings Crusher in your plant.

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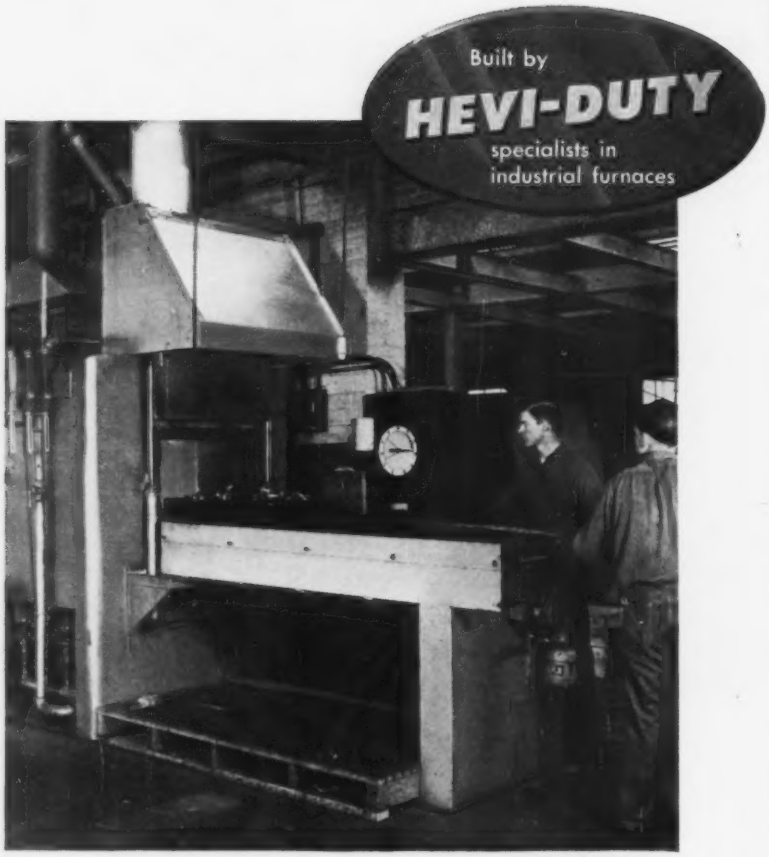

Clean-Line Furnaces Demonstrate The Ultimate in Automatic Heat Treating At Superior Metal Treating Corp.

Superior Metal Treating Corp., Muncie, Indiana, was so pleased with the performance of a Clean-Line furnace under conditions that really test — and prove — heat treating equipment, that they recently installed a second identical furnace. The Hevi-Duty furnaces are used 24 hours a day, 5 days a week for carburizing, carbonitriding and bright hardening. Heating and cooling, or oil quenching, are automatically timed and controlled. The operations are done under protective atmosphere.

The furnaces produce full uniform hardness and depth, even in 500-lb loads of small parts. Heating cycles are as short as 20 minutes, and temperatures range up to 1925° F.

In the original furnace, radiant tubes are still in good condition after a year of use under these demanding conditions. This Clean-Line furnace uses only about 300 CFH of prepared atmosphere, further evidence of its excellent efficiency.

Perhaps this combination of durability and automatically controlled production has a place in your heat treating operation. For full information, write for Bulletin D-100.

- Industrial Furnaces electric and fuel
- Laboratory Furnaces
- Dry Type Transformers
- Constant Current Regulators

HEVI-DUTY ELECTRIC CO.
Milwaukee 1, Wisconsin

FREE LITERATURE

purpose steel bar stock. (LaSalle Steel Co.)

For free copy circle No. 15 on postcard, p. 109

Mountings

Vibration isolation and heavy shock absorption features of center bonded mountings are discussed in a 4-page bulletin. These mountings protect portable and other equipment subject to vibration and shock. (Lord Mfg. Co.)

For free copy circle No. 16 on postcard, p. 109

Foundry Blowers

Blowers for foundry cupolas are covered in a bulletin. It discusses both rotary positive displacement blowers and centrifugal blowers. Thus, it's an unbiased guide to help you select the type best for your own requirements. (Roots-Connersville Blower).

For free copy circle No. 17 on postcard, p. 109

Quiet Ventilators

Centrifugal type roof ventilators presented in an 8-page brochure come in 13 basic ventilator sizes. Some 111 different motor and belt-drive combinations are listed. (American Blower Div.)

For free copy circle No. 18 on postcard, p. 109

Brass Rod

In 24 pages a booklet covers brass rod mill products. Weight, size and tolerance tables and specifications are listed for free-cutting brass, commercial bronze, nickel-silver, high silicon brass, manganese bronze, forging rods and shapes and brass wire. (For free copy write on company letterhead to Titan Metal Mfg. Co., Bellefonte, Pa.)

Rotary Pumps

General-purpose internal gear rotary pumps are detailed in a bulletin. It discusses how each pump works and how it's constructed. (The Deming Co.)

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"We block with the silicon in this new chrome"

Savings in chromium and silicon costs for open-hearth steels can be made with new ELECTROMET high-silicon refined chrome. A very low-cost source of chromium, the alloy also provides 11 per cent silicon for blocking.

Savings of approximately $1.00 per ton can be made over practices using exothermic ferrochrome in the ladle.

When used for blocking, high-silicon refined chrome dissolves readily and gives tight blocks for the full time required with no phosphorus reversion. Consistently high chromium recoveries have been reported. For further details, contact your UNION CARBIDE METALS representative.

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Any size refrigerator doors— the easy way

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What's more, this line is unitized . . . stations are put together in sections so the line can be altered to meet design changes in later models. All added parts, such as thimbles and nuts, are fed from hoppers, automatically positioned and welded into place.

If you are making metal products that require several operations, why not ask a Federal/Warco engineer in to show you how a Packaged Production Line can put you in a better competitive position.

Close-up of refrigerator door panel shows operations performed on the line. Right corner is gas annealed and embossed. Three holes are pierced in the piece, and hinge pin retainer and nut stop are automatically welded into exact position.

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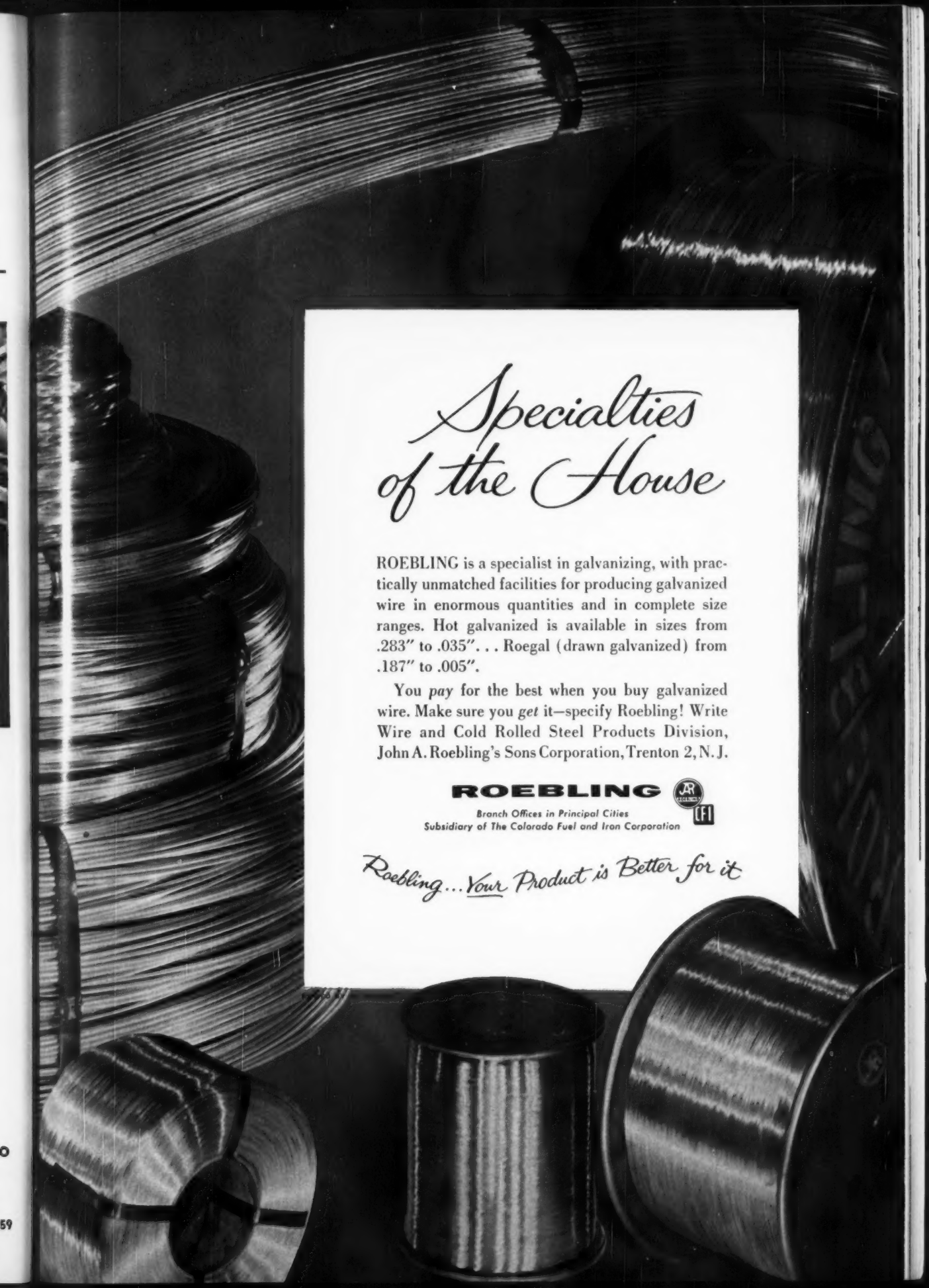
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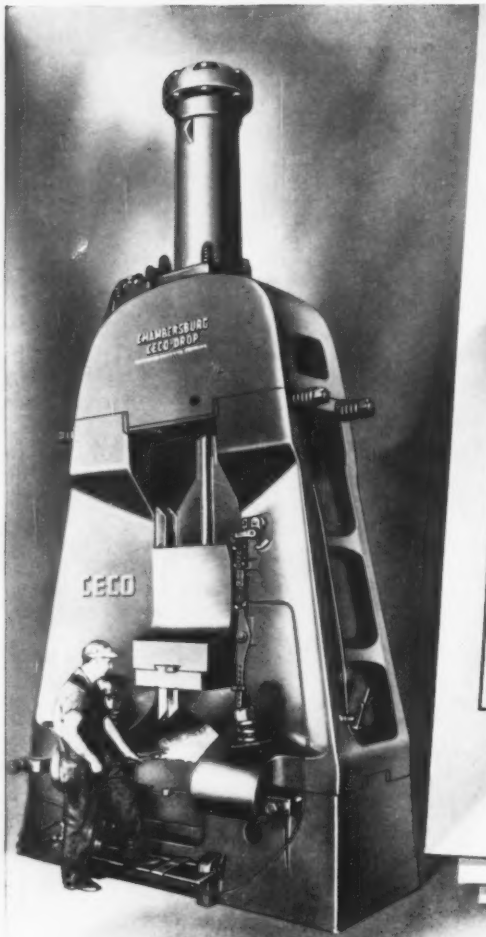
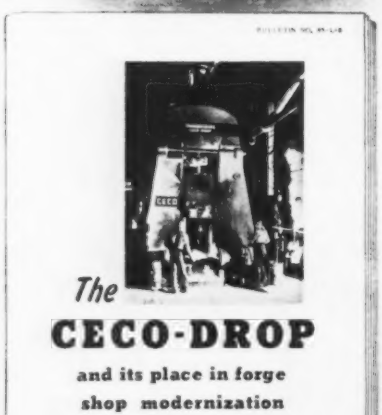
of the House
ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283" to .035". . . Roegal (drawn galvanized) from .187" to .005".
You pay for the best when you buy galvanized wire. Make sure you get it—specify Roebling! Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.
ROEBLING
Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation
Roebling... Your Product is Better for it



components such as anvils, frames and heads of many of the hammers are in need of replacement.

-21-



A Realistic Approach to Forge Shop Modernization

During the past few years, mounting competition has caused forge shop managers to seek ways to further increase production and reduce costs. A number have scrapped their old board hammers replacing them with Ceco-Drops, the modern piston-lift gravity-drop hammer. These shops have thus placed themselves in a position to get more business—and they are getting it! ● A wealth of helpful information is available in Chambersburg's new 28 page forge shop modernization bulletin. Based on studies made in prominent forge shops, this publication assists you to formulate your own step-by-step modernization program. Write for a copy today.

CHAMBERSBURG ENGINEERING COMPANY · · CHAMBERSBURG, PA.

FREE LITERATURE

Continued

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Parts Washer

For washing parts that roll, a high-level washer serves automated gear processing lines. It needs no part elevators and washes 950 parts per hour. A data sheet gives details. (Gear-O-Mation Div., Michigan Tool Co.)

For free copy circle No. 21 on postcard

Surface Heating

A handy 4-page guide shows how to select equipment and controls for surface heating. It covers: type of heater, ratings for surface or platen heating, heat-up time for metallic platens, thermostats and controls. (General Electric Co.)

For free copy circle No. 22 on postcard

Control Valve

Air and hydraulic control valves shown in an 8-page bulletin include manual, electrical, mechanical and pilot actuated types, ⅛ to 1-in. NPT sizes. (Beckett-Harcum Co.)

For free copy circle No. 23 on postcard

Magnetic Starters

Magnetic starters for machine tools and other setups are shown in a 15-page booklet. These alternating-current starters come in NEMA sizes O through 4. They fit both reversing and non-reversing single phase and squirrel cage motors. (Cutler-Hammer Inc.)

For free copy circle No. 24 on postcard

Molding Compound

High impact molding compound just introduced is reinforced with glass fiber rovings ½ and 1-in. long. Glass fiber is impregnated with a phenolic resin. A 6-page booklet advises appropriate molding equipment and mold design. (Hooker Chemical Corp.)

For free copy circle No. 25 on postcard

Resistance Welding

A 28-page bulletin tells about resistance welding in all phases. It covers spot, projection, seam and flash welding. (Federal Machine & Welder Co.)

For free copy circle No. 26 on postcard

Maintenance Parts

In 24 pages, a booklet explains how to make your own repair parts quicker, easier. It may help solve your maintenance and repair part problems. (La Salle Steel Co.)

For free copy circle No. 27 on postcard

Vinyl-clad Plate

Colorful vinyl, clad to practically any material, is offered in a catalog sheet. Resulting clad material resists abrasion, corrosion, heat, some acids, detergents, etc. Surface will not mar, scratch or chip. (North-East Laminates, Inc.)

For free copy circle No. 28 on postcard

Pressure Regulator

Cylinder, manifold and station pressure regulators are presented in a 36-page booklet. It gives flow and pressure, and inlet and outlet connection dimensions for each regulator. (Air Reduction Co., Inc.)

For free copy circle No. 29 on postcard

Poreclain Aluminum

Porcelain enamel on aluminum is described in a brochure. Vitreous enamel is fused on. This gives the metal considerable rigidity and resistance to impact, chemicals, abrasion, heat, or stains. (Argosy Industries, Inc.)

For free copy circle No. 30 on postcard

Water Valve

Protecting water lines against overpressure is the job of a surge relief valve described in a bulletin. The valve is extremely sensitive. It opens instantly when line pres-

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **2/26/59**

Circle numbers for Free Technical Literature, Design Digest, or New Equipment:

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61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
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FIRST CLASS
PERMIT No. 36
NEW YORK, N. Y.

BUSINESS REPLY CARD
No postage necessary if mailed in the United States

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THE IRON AGE

Post Office Box 77, Village Station
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91	92	93	94	95	96	97	98	99	100
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FREE LITERATURE

sure exceeds the pilot setting. Line pressure itself powers the valve automatically. (Golden Anderson Valve Specialty Co.)

For free copy circle No. 31 on postcard

Shop Shelving

Quick-change shelving and steel shop equipment are double-billed in an 8-page bulletin. (Columbia-Hallowell Div. Standard Pressed Steel Co.)

For free copy circle No. 32 on postcard

Nickel Plating

Answers to 40 questions about nickel plating appear in a 24-page booklet. (International Nickel Co.)

For free copy circle No. 33 on postcard

Drive Sheave

Integral shaft sheaves for low-cost stepless speed control in large machine drives are outlined in a bulletin. (Allis-Chalmers Mfg. Co.)

For free copy circle No. 34 on postcard

Missile Silicones

Silicones for missile design are discussed in an 8-page brochure. Silicones can aid miniaturization, reduce weight and increase reliability. (Dow Corning Corp.)

For free copy circle No. 35 on postcard

Dew Point Units

Automatic dew point recorders and controllers are covered in a folder. (Surface Combustion Corp.)

For free copy circle No. 36 on postcard

High-lift Stackers

Advantages of four high-lift, battery powered hand trucks are given in a 6-page brochure. (Clark Equipment Co.)

For free copy circle No. 37 on postcard

High-heat Alloys

A new bulletin lists temperature ranges for heat-resisting alloys such as: Inconel 600 and 702, Incoloy 804 and 901, Types 330 and 314 stainless, Chromax, Inconel, Incoloy and Inconel X. (Techalloy Co., Inc.)

For free copy circle No. 38 on postcard

Magnetic Drills

Magnetic drill stand applications are discussed in a 4-page bulletin. It covers three new units for air or electric drills up to 2-in. capacity. (Thor Power Tool Co.)

For free copy circle No. 39 on postcard

Wire Packaging

Methods of wire packaging are shown in a folder. It presents advantages of each. (Wickwire Spencer Steel Div., Colorado Fuel and Iron Corp.)

For free copy circle No. 40 on postcard

Presses

Bench and floor style, 2-ton and 5-ton power presses are featured in a bulletin. They include standard, deep throat and air friction clutch models. (Sales Service Mfg. Co.)

For free copy circle No. 41 on postcard

Needle Bearings

Needle thrust bearings with increased capacity ratings are covered in a catalog. Bearings come in bore sizes from ⅜ to 3 in. (The Torrington Co.)

For free copy circle No. 42 on postcard

Milling Machines

Special milling machines appear in a 32-page bulletin. Types include: straight-line, vertical open-side, sliding head, shuttle, rise and fall, rotary index, traverse, planer and traveling column. (Consolidated Machine Tool Div., Farrel-Birmingham Co., Inc.)

For free copy circle No. 43 on postcard

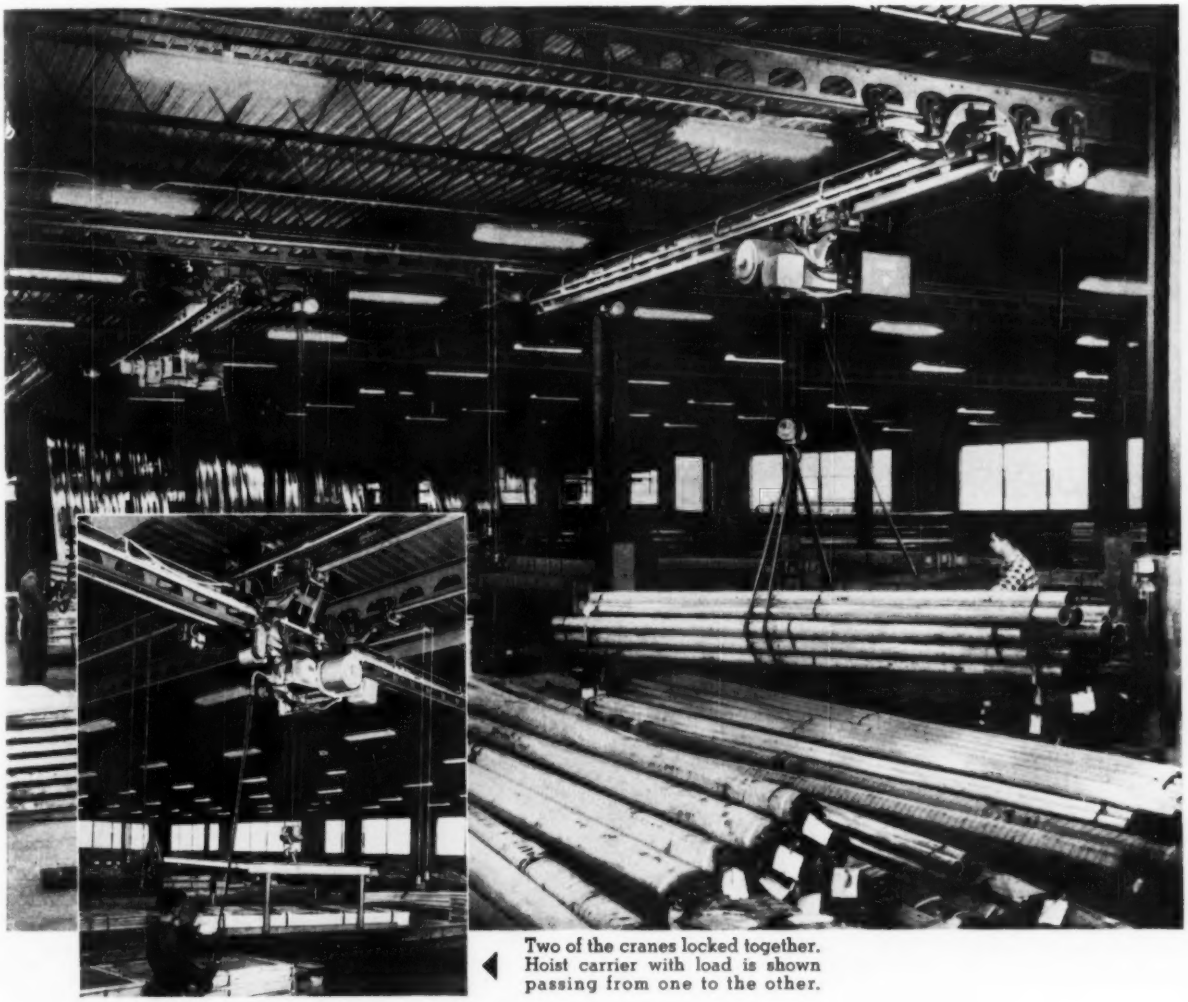
Air Hoist

A leaflet announces a recently developed air hoist. The hoist uses a rotary air motor for smooth accurate handling. Capacities range from 500 to 4000 lb. (Detroit Hoist & Machine Co.)

For free copy circle No. 44 on postcard

Large bundles of pipe, sheets, etc., are quickly handled from receiving dock to any spot in the warehouse *without rehandling* by the overhead Cleveland Tramrail transfer cranes. Whitehead Metal Products Co., Inc. specialize in a wide variety of nonferrous metals.

TRAMRAIL CRANES
SAVE WAREHOUSE SPACE
Improve Materials Handling Efficiency



Two of the cranes locked together. Hoist carrier with load is shown passing from one to the other.

In the large modern warehouse of Whitehead Metal Products Co., Inc., Cambridge, Mass., the entire job of unloading incoming materials, placing in storage and handling for outgoing shipments is done with Cleveland Tramrail transfer cranes.

The cranes have proven most practical for this service. They can transport long, unwieldy bundles of pipe in much narrower aisleways and turn them ninety degrees for piling without need of wide turnaround areas. As a result, an important amount of floor space is saved, and this provides considerable additional storage capacity.

Three cranes on separate, adjacent runways are used at Whitehead. However, there are only two hoist carriers, one of two tons, and the other of three tons capacity. Either can be transferred to any crane. The equipment is completely motorized, push-button operated. Conductors are SAFPOWRBAR. (SAFPOWRBAR electrification has been approved by the Underwriters Laboratories, Inc. and the Canadian Standards Association.)

Hundreds of warehouses handling materials of nearly every kind are profiting by installations of safe, dependable, time-saving Cleveland Tramrail cranes and track systems.

Write for free Engineering and Application Booklet No. 2008. Packed with valuable information.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4845 E. 290 ST. • WICKLIFFE, OHIO

Color micrograph of heat tinted section of ferritic Malleable iron showing random dispersion of temper carbon nodules in ferrite. 625X magnification.

Usability is Malleable

In the growing world of metals, certain requirements remain basic: strength . . . versatility . . . economy. Malleable iron castings uniquely answer all three. Malleable castings provide more strength per dollar than any other metal . . . are the most machinable of all ferrous metals of similar hardness.

From the great range of Malleable irons now produced in modern Malleable foundries, you can select exactly the right metal to fill your most demanding needs for endurance, resistance to impact and wear, ductility and constant uniformity. No other metal offers you so much at so low a cost.

For information or service, call on one of the progressive firms that identify themselves with this symbol—

MEMBER

MALLEABLE CASTINGS COUNCIL

If you wish, you may inquire direct to the Malleable Castings Council, 1800 Union Commerce Building, Cleveland 14, Ohio, for information.

These companies are members of the

MALLEABLE CASTINGS COUNCIL

CONNECTICUT
Connecticut Mall. Castings Co., New Haven 6
Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Link-Belt Company, Indianapolis 6
Muncie Malleable Foundry Co., Muncie
Terre Haute Mall. & Mfg. Corp., Terre Haute

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

NEW JERSEY
Meeker Foundry Company, Newark 4

NEW YORK
Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Canton Malleable Iron Co., Canton 5
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
Maumee Malleable Castings Co., Toledo 5
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Badger Malleable & Mfg. Co., S. Milwaukee
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

How to Select the Best Metal to Perform a Given Set of Functions

Any equipment part can be described, at least approximately, in terms of the functions it must perform. That is, it must provide a certain strength plus resistance to wear, fatigue, impact or corrosion. The finished part must provide the best combination of all necessary factors at the lowest possible cost — a cost that must include machining, finishing and assembly where applicable.

Unique Production Method Combines Desirable Characteristics

The amount and form of carbon in ferrous metals is of prime importance. The carbon content of Malleable iron (2.00 to 2.60%) provides good fluidity at the pouring stage. Yet neither flake graphite nor combined carbon is present in finished standard Malleable iron.

As the photomicrograph of standard Malleable iron shows, the carbon has been transformed into temper carbon nodules in a matrix of ferrite during the heat-treatment given *all* Malleable iron castings. The result is a metal with a unique combination of high strength, toughness and machinability.

Pearlitic Malleable irons differ from standard, or ferritic, Malleable only in that a controlled amount of the carbon is combined with the iron to form a pearlitic matrix around the temper carbon nodules. This increases strength, hardness, wear resistance and modulus of elasticity, while retaining good ductility and machinability.

TENSILE PROPERTIES — A.S.T.M. MINIMUM SPECIFICATIONS

Standard and Pearlitic Malleable Irons				
Designation	Tensile Strength p. s. i.	Yield Strength p. s. i.	Elongation % in 2 in.	Ratio of Tensile to Yield %
Standard				
35018	53,000	35,000	18	66
32510	50,000	32,500	10	65
Pearlitic				
45010	65,000	45,000	10	69
45007	68,000	45,000	7	66
48004	70,000	48,000	4	69
50007	75,000	50,000	7	67
53004	80,000	53,000	4	66
60003	80,000	60,000	3	75
80002	100,000	80,000	2	80

Strengths up to 135,000 p.s.i. tensile and 110,000 p.s.i. yield are produced commercially under individual producers' specifications.

TYPICAL BRINELL HARDNESS NO. RANGES

Pearlitic Malleable Irons							
Designation	45010	45007	48004	50007	53004	60003	80002
B. H. N.	163-207	163-217	163-228	179-228	197-241	197-255	241-269

New Savings Result

From the wide range of properties obtainable, a Malleable iron may be selected that will most completely meet ideal design and functional requirements. Because of the great latitude of producible sizes, from a fraction of an ounce to hundreds of pounds, Malleable can be used for a wealth of applications.

Malleable iron's economy is derived in two ways. First, the casting process is generally accepted as the most economical method of producing a finished part. Secondly, being the most machinable of all ferrous metals of similar hardness, cast or otherwise, Malleable iron castings provide exceptional economies in time, tool and power consumption.

Today's Malleable iron castings offer tremendous strength, uniformity, versatility and economy. The producers of Malleable castings are anxious to assist you in getting maximum "usability." Why not let their modern design, testing and production facilities work for you?

Send for Special Data Unit

Your copy of Data Unit No. 101 containing additional information on the benefits you can derive from Malleable iron castings is available from any member of the Malleable Castings Council. If you wish, you may direct your request to **Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.**

New Materials and Components

Lubricant Pump's Power Needs Are Very Low

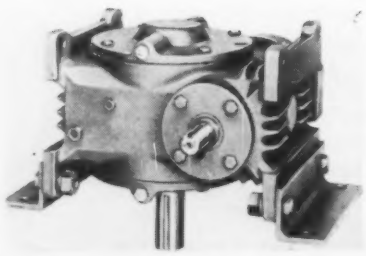
Smooth, rolling action of this pump's components keep its power requirements very low. Designed to handle lubricating or hydraulic oils at 20 to 300-psi, 1200 to 1800-rpm, the gear type pump comes in four models. These provide left or right-hand shaft rotation. Capacities range from 38 to 41 gph at 1200 rpm, 57 to 62 gph at 1800 rpm. The pumping member has a small inner roller, keyed to the shaft, which drives the outer member at 25 pct below motor speed. This means quiet operation, long pump life. Models come in four pressure ranges: 20 to 40, 40 to 80, 80 to 150 and 150 to 300 psi. Pumping action produces a vacuum up to 25 in. mercury maximum. (Hydraulic Div. Sundstrand Machine Tool Co.)

For more data circle No. 54 on postcard, p. 109

Knurls On High Tensile Bolt Assure Tight Fit

A knurled body engages structural members being fastened by this unique high-tensile bolt. Developed by Lamson & Sessions Co., Cleveland, the knurls are set on a spiral which reduces the driving load. Length of the knurled body depends on thickness of members being joined. When the bolt is driven or pulled into place it makes a body bound fit. The bolt's head resembles a rivet's, which permits driving with standard tools. Only one washer under the nut is necessary. A washer isn't needed under the head. Washers and nuts are same as specified for high-strength structural bolts. (U. S. Steel Supply Div., U. S. Steel Corp.)

For more data circle No. 55 on postcard, p. 109



Worm Gear Speed Reducer Saves Floor Space

Floor space and money are often the same thing; save one and you save the other. This speed reducer does just that. It confines both reducer and power source to minimum space. The worm gear unit mounts directly onto the motor in any one of three different positions; worm shaft can be below the gear, above it, or with output shaft vertical. Motor and reducer form a compact single setup using chain or V-belt drive. (Link-Belt Co.)

For more data circle No. 56 on postcard, p. 109

Fibrous Silicone Rubber Shows High Strength

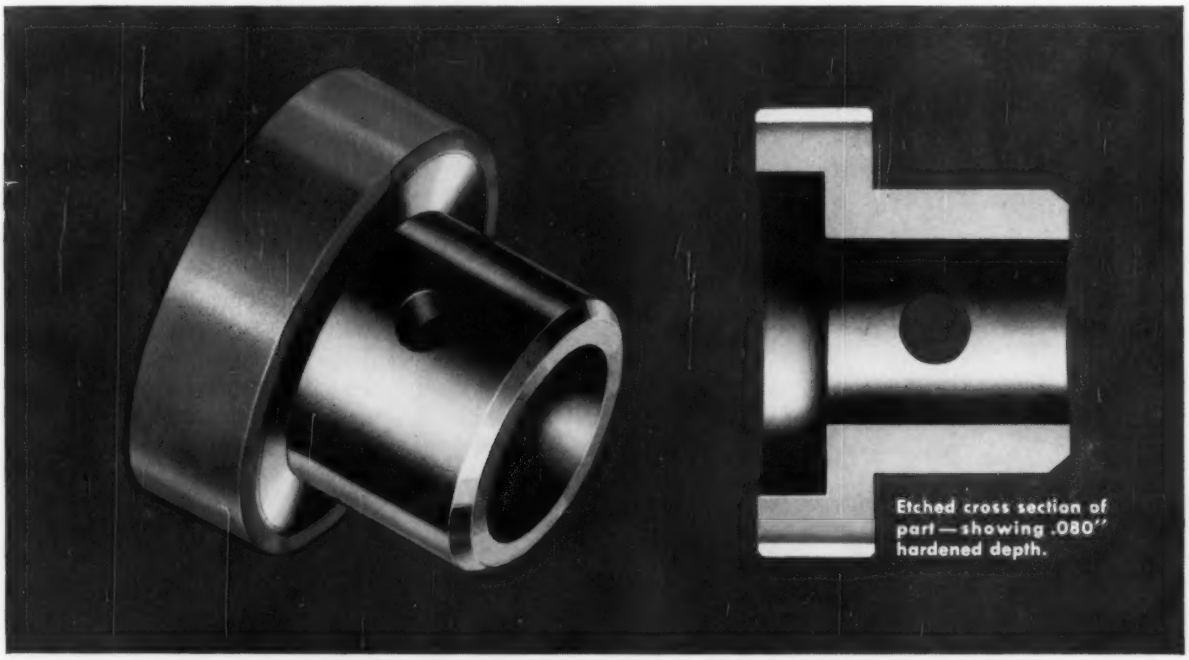
Relatively high mechanical strength is a key advantage of a new silicone rubber material. Fibrous in nature, the product somewhat resembles foam and sponge in properties. However, random orientation of its silicone rubber fibers results in comparatively high tensile and tear strength. Also, the silicone rubber has high permeabil-

Costs Cut 94%

with

TOCCO* *Induction Heating*

A cost reduction of 94% resulted when heat-treatment of this Corn Harvester part was changed from carburizing to TOCCO-hardening. Look at the unit cost breakdown:



CARBURIZING		TOCCO-*Hardening*	
Degrease	$0.0020	eliminated	
Carburize	0.0200	eliminated	
1st quench	0.0150	TOCCO, heat and quench	$0.0060
2nd quench	0.0150	eliminated	
Draw	0.0050	eliminated (self-draw)	
Shotblast	0.0035	eliminated	
Internal Grind	0.0243	eliminated	
External Grind	0.0166	eliminated	
	$0.1014		$0.0060

"... Savings of 9½ cents per piece—$4770.00 on each 50,000 piece batch, *plus* an hourly production increase from 120 to 300 pieces per hour, plus improved quality of the product by virtue of the deeper case and stronger core."

Have you investigated TOCCO's cost-savings possibilities for your hardening, brazing, melting or forging operations? Why not write us today or send blueprints of your parts—no obligation, of course.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today— NEW FREE Bulletin

The Ohio Crankshaft Co. • Dept. A-2, Cleveland 5, Ohio

Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating."

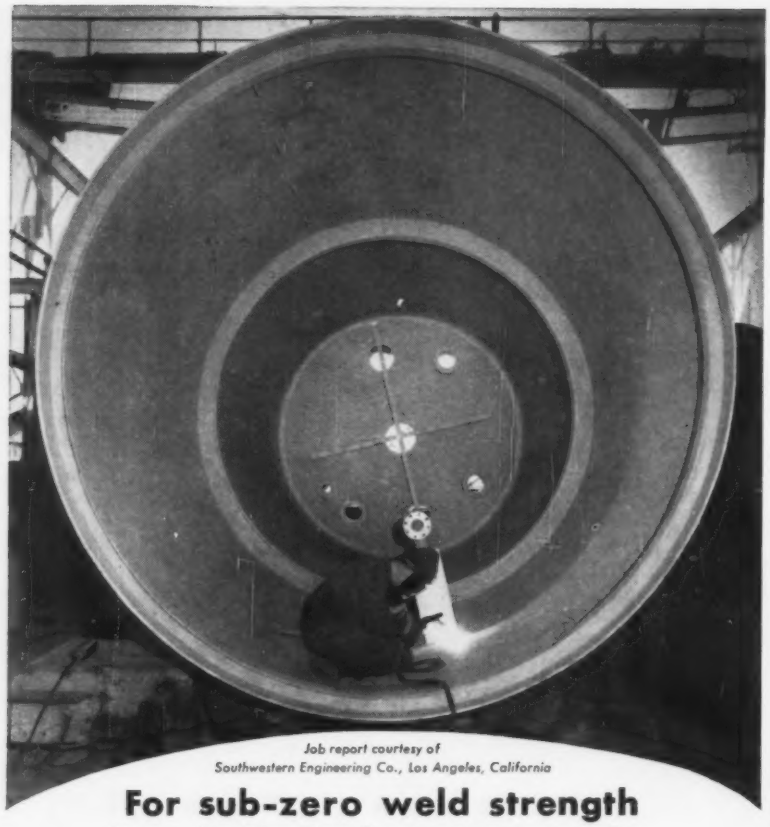
Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____



Job report courtesy of
Southwestern Engineering Co., Los Angeles, California

For sub-zero weld strength in missile fuel storage tanks

WELD WITH ARCOS

STAINLESS ELECTRODES

When completed, this tank will hold a liquid propellent fuel under 125 lbs. psi. Service temperatures will range from plus 200°F down to *minus* 300°F. The customer selected type 321 stainless for the vessel. To assure required impact strengths at extreme temperatures, Arcos STAINLEND 19/9Cb electrodes were recommended. This top quality weld metal joins the heads, shell seams, fittings and all attachments. Again—the tougher the test, the greater the need for Arcos. ARCOS CORPORATION, 1500 S. 50th Street, Philadelphia 43, Pa.

DESIGN DIGEST

ity, 20 lb per cu ft density, good compression - deflection characteristics. Useable temperature range for the material is —65 to +500°F. It's available presently from pilot plant equipment in sheets ¼-in. thick, 9-in. wide, 6-ft long. The material's producer anticipates that as new applications develop, the fibrous silicone rubber will be made in continuous lengths, larger widths and of various thicknesses. (The Connecticut Hard Rubber Co.)

For more data circle No. 57 on postcard, p. 109

Quality Control

Miniature "electric eyes" are now available for industrial quality control. The tiny photoelectric cells eliminate timers and mechanical contacts in monitoring objects moving at varying speeds and positions. One beam can time inspection

while another beam monitors. Beams may be direct light cut-off or reflected or a combination of both. Extremely small, the units fit into tight spots. (Photomation, Inc., formerly Ess Instrument Co.)

For more data circle No. 58 on postcard, p. 109

Swaged Parts

Pins and small tubular parts are available which offer close tolerances and high dimensional accuracy. Parts can be beaded, grooved, headed or shouldered to meet any practical requirement. Swaged pins can be hollow throughout their entire length. This makes

a ready-made passageway for lead wires or other parts. Most standard pins come pre-slit, if desired, to provide an even, four-point overlay. Most metals and finishes are available. (Auto-Swage Products, Inc.)

For more data circle No. 59 on postcard, p. 109

Seal Fitting

Tapered pipe threads let a new O-ring seal fitting connect to existing female pipe threads, positively sealing without need for chemical sealants. The O-ring seal in this fitting is integral with its body. When tightened against the mating surface, it prevents even minute leaks. This permits use on pressure or high-vacuum connections. (Crawford Fitting Co.)

For more data circle No. 60 on postcard, p. 109

Heat-Resist Alloy

Air-hardening, a new specialty steel, has strength at high temperatures. The alloy resists softening during continued exposure up to 1000°F. It displays high toughness and ductility at tensile strength levels up to 300,000 psi. The material air-hardens to full hardness even in large section sizes. (Latrobe Steel Co.)

For more data circle No. 61 on postcard, p. 109

Motor Mount

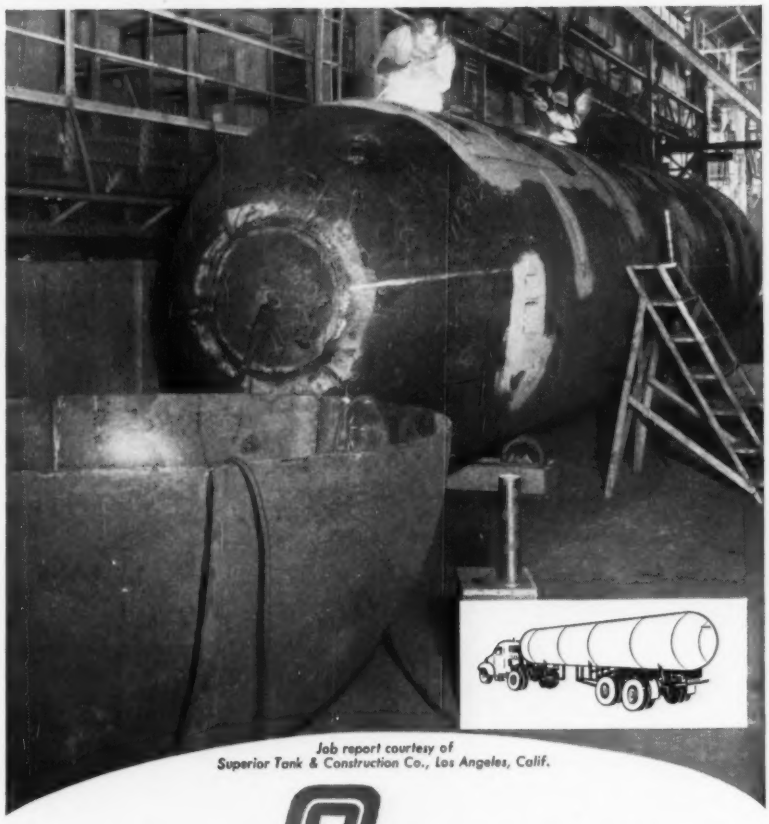
Of the twin-arm type, a wire motor mount can reduce necessary shaft height by ¼-in. or more. It allows the base of the motor frame to nest between its two parallel base wires. This, plus its light weight, particularly suits it to air-conditioning units, portable appliances, and other applications where compactness is important. (E. H. Titchener & Co.)

For more data circle No. 62 on postcard, p. 109

Coating Material

High film strength, resistance to chemicals and high-gloss are advantages of a new coating material. It adheres very well to many surfaces. Put on by brush or spray, it can be used to coat and protect

How X-Ray Quality Welds Make Low Alloy Steels Pay Off

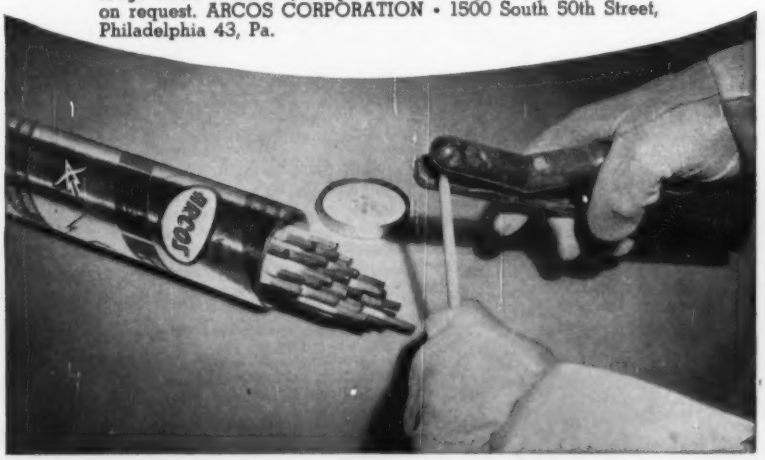


Job report courtesy of Superior Tank & Construction Co., Los Angeles, Calif.

WELD WITH ARCOS

LOW HYDROGEN ELECTRODES

The vessel being welded is part of an L.P.G. tank truck. For high strength with low weight—USS "T-1" steel is used and welded with Arcos Ductilend 110 Electrodes. These tanks meet or exceed ASME code requirements . . . and all Ductilend 110 welds qualify with X-ray soundness. Ductilend 110 is an Arcos Low Hydrogen Electrode especially developed for welding high strength notch tough steels of the 110,000 psi tensile strength range. Data sheet on request. ARCOS CORPORATION • 1500 South 50th Street, Philadelphia 43, Pa.



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Since 1903

Made to highest standard and uniform quality thus insuring maximum service.

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Round, Square, Oblong Punches and Dies, Rivet Sets

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32 Different Models in the 2-15 Ton Range — Each with Greater Selections of Shutheights, Stroke Lengths and Strokes per Minute.

GREATEST SELECTION OF SHUTHEIGHTS AVAILABLE

Six different Shutheights are offered in Kenco 5, 8 and 15 ton presses. This selection includes Standard, Electro-Safe, Variable Speed and Slow Speed Presses.

You will produce stampings at less cost if you select a Kenco Press exactly suited to the requirements of your job. With the greatest selection available from the Kenco Catalog, there is no need to compromise on shutheight, strokes per minute, throat depth or any other specification. Kenco will most nearly meet your specific needs.

KENCO MANUFACTURING CO

5211 Telegraph Rd., Los Angeles 22, Calif.

Kenco features include up to 100% stronger frame; solid steel, heat treated crankshaft free from weakening slots, Cyclo-Safe Roller Clutch, extra long "V" type Ram Guides and many other cost saving features.

Write for our new Bulletins that give complete information and specifications on Kenco Presses. There is no obligation

The Most Complete Line of Small Punch Presses in the World

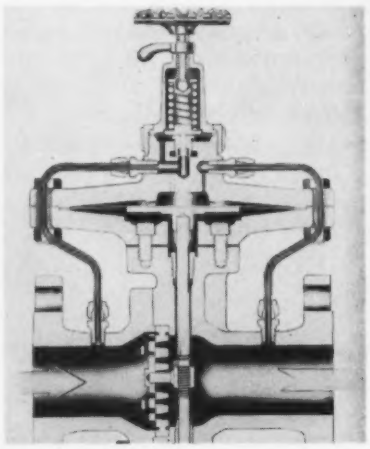
DESIGN DIGEST

magnesium and aluminum. It can be applied by dipping. The elastomer is available both clear and colorless as well as in many colors, in various degrees of gloss. (Howley Chemical Co.)

For more data circle No. 63 on postcard, p. 109

Pressure Regulator

Pilot operated, a back pressure regulating valve incorporates a sliding gate and plate main valve. It features: self-cleaning seats, integral pilot with filter screen, oversize clog-resistant passages, and a ball bearing adjusting screw with handwheel. Short stroke with metal



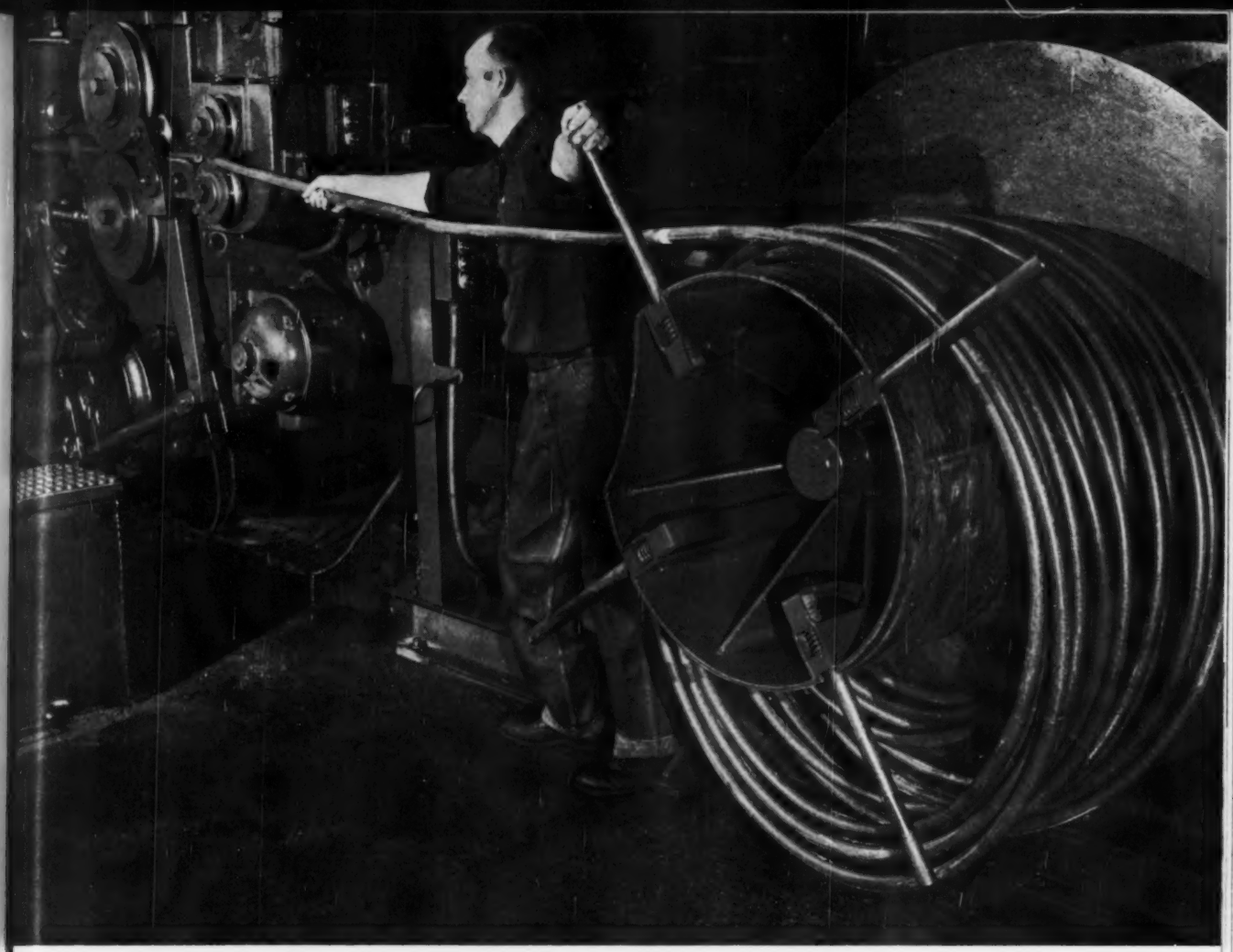
seats and metal diaphragms gives long life with little maintenance. Self-lapping seats assure tight shutoff. Sizes: 2½ and 3 in. Body: cast-iron flanged, 125 or 250-psi ASA connections. It's suitable to 250-psi pressures, 406°F temperatures. (OPW-Jordan).

For more data circle No. 64 on postcard, p. 109

Overtravel Switch

A compact appliance switch features high overtravel. Giving long, trouble-free service, it has a special plunger mechanism. This provides a minimum 0.200-in. overtravel without curtailing switch life. Median mechanical life of the new switch is more than 2,000,000 operations at full overtravel. (Micro Switch Div., Minneapolis-Honeywell Regulator Co.)

For more data circle No. 65 on postcard, p. 109



"New large coils of J&L hot rolled bars permit longer production runs"

. . . states industrial fastener manufacturer

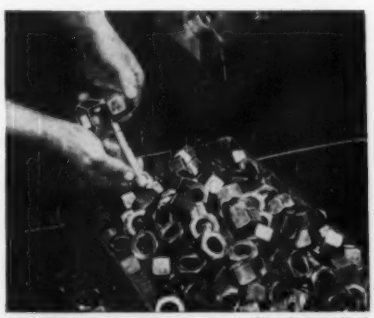
"Use of large coil weights in J&L hot rolled bars enables us to increase production through longer runs, reduced machine downtime," reports Mr. Robert McCombs, General Manager of Russell, Burdsall & Ward's Coraopolis, Pa., plant.

"We are able to cold form ¾" heavy hexagon nuts, 1¼" across the flats, from J&L's C-1110 scrapless nut quality bars, without surface cracks, at high speed. This is a severe test of hot rolled steel quality."

R. B. & W., one of the oldest and largest manufacturers of industrial fasteners, uses J&L steel in both low and medium carbon grades as well as the C-1110 steel.

Investigate J&L's superior quality hot rolled bars for your toughest cold forming applications. Bars are now available in coil weights up to 1300 pounds.

Call in a J&L steel specialist for recommendations on how to improve physical characteristics of your end products and to increase your production rate. Write Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.



J&L C-1110 scrapless nut quality hot rolled bars, 1½" diameter, are used in producing these R. B. & W. nuts, 1¼" across the flats, with ¾" tapped diameter.

Jones & Laughlin Steel Corporation

STEEL

PITTSBURGH, PENNSYLVANIA

New Equipment and Machinery

Automation and Chipless Machining Team Up

Automatic hydraulic tracer control helps this setup make a push-button operation of chipless machining complex parts at high output. Automatic cycling, the equipment turns out up to 16-in. diam, 15-in. long pieces at production rates. Automatic feed and unfeed is also possible. The machine produces conical, cylindrical, contoured shapes or combinations of these from flat blanks, preformed blanks or machined blanks. It works virtually any metal or alloy with speed and ease. Metal flowing rollers are synchronized; they work in the same plane, opposed to each other to eliminate deflection and assure accuracy. Vertical design and easy to reach work area not only make automatic workpiece handling feasible, they speed manual loading and unloading too. Main drive motor is 40 hp. (Lodge & Shipley Co.)

For more data circle No. 45 on postcard, p. 109

Tracer Attachment Converts Lathes Quickly

Completely self - contained, this air-gage tracer unit can be put on Monarch lathes in the field. It adapts to several models without reducing their swing capacity. Removal of the regular compound rest permits quick attachment of the tracer slide assembly to the cross slide. This assembly consists of a hydraulically powered tool slide and a swivel base. The latter has the proper height and bolt circle size for use on a particular lathe. Being of the swiveling type, this tracer set-up is versatile enough to handle complex turning, boring and facing operations. The template support clamps to the front bed "V." Micrometer dials provide for longitudinal and cross adjustment of the template position. For quick and accurate template alignment a swivel pin on the support is used in conjuction with a micrometer adjusting bracket. (Monarch Machine Tool Co.)

For more data circle No. 46 on postcard, p. 109

Welder Eliminates Hand Filling of Vital Areas

Eliminating filling-in of strategic spots by manual welding is this twin-fillet welder. It automatically welds stiffeners, flanges and other structural components from corner to corner. The heavy duty, aluminum construction machine carriage and power supply have dual automatic wire feeds. These can work individually for semi - automatic jobs. Units are available for submerged melt, inert arc or other consumable welding processes. All feature positive high frequency arc initiation. An electronic governor controls travel speed; it will not vary under load. Speeds run from zero to 60-ipm. Two 500-amp dc 3-phase constant voltage welding machines are in the one console. (L & B Welding Equipment, Inc.)

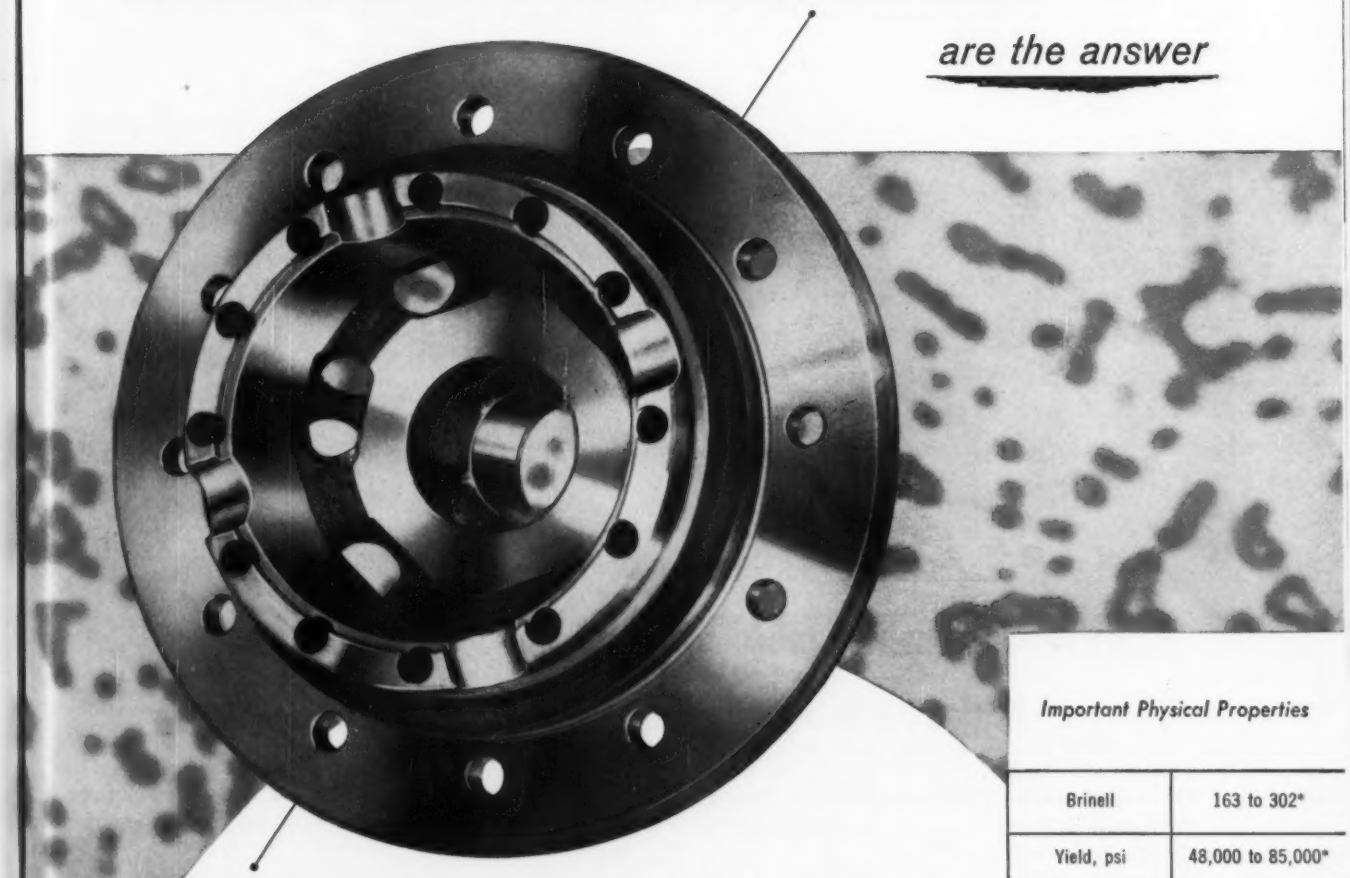
For more data circle No. 47 on postcard, p. 109

is your problem

machinability?

NATIONAL HTM CASTINGS

are the answer



There are many reasons for specifying HTM (Pearlitic Malleable) castings for your product. One is *machinability of 70-90 percent* (B1112 steel = 100).

But there are many other equally valid reasons. High ultimate strength . . . extreme wear resistance under heavy loads and high speeds . . . non-seizing qualities . . . air or liquid quenching . . . ability to be smooth-finished.

So when you're looking over the materials field, don't overlook the advantages of HTM castings. For HTM metal can be cast by either the shell mold, CO_2, or green sand methods. This means production costs tumble . . . performance and saleability of your product go up.

Important Physical Properties

Brinell	163 to 302*
Yield, psi	48,000 to 85,000*
Ultimate, psi	70,000 to 110,000*
Elongation, %	7 to 2*

**Depending upon grade*

member MALLEABLE CASTINGS COUNCIL

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Established 1868 — *Cleveland 6, Ohio*

The nation's largest independent producer of malleable and pearlitic malleable

Experience**—the extra alloy in **Allegheny Stainless

key words in solving production puzzles:

Allegheny for Stainless; Ryerson for Service

If one of your toughest production puzzles is getting top quality stainless steel *when* you need it, check in now with the Allegheny-Ryerson combination.

Allegheny Ludlum is the leading producer of stainless steels in all forms. And Ryerson, long recognized as the largest and best steel service center, carries Allegheny Stainless. This unbeatable team brings you the best quality stainless quick, when you need it.

Ryerson now stocks 2,351 shapes, sizes, finishes and alloys of Allegheny Stainless . . . the most complete line of stainless anywhere! And Ryerson relieves you of the inventory cost, gives you as quick service as your own stockroom.

Whether your order is for Allegheny Stainless sheet, plates, bars or whatever, Ryerson stocks it. Trained salesmen and technicians to help in selecting or in fabricating are at your service.

Call Ryerson, for top quality Allegheny Stainless from warehouse stocks. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

WSW 7124

ALLEGHENY LUDLUM

for warehouse delivery of Allegheny Stainless, call RYERSON

Export distribution: AIRCO INTERNATIONAL

EVERY FORM OF STAINLESS . . . EVERY HELP IN USING IT

Gage Logging

Bringing advanced computer techniques to industry is a new gage logging system. It records and counts selected events in a process (e.g., cold rolling). Systems record on an electric typewriter. (Computer Dept., General Electric Co.)

For more data circle No. 48 on postcard, p. 109

Crane Control

Offering complete protection against accidental weight overloading of hoists and cranes is this sensitive control. Switches are housed in a heavy metal junction box. Rain, dirt, moisture or dust are thus effectively sealed out. When a crane attempts to lift a load that's

over a pre-determined danger point, the unit shuts off current before any accident can occur. In fact, it shuts off so fast that costly lifting equipment doesn't even undergo excessive wear and tear. (W. C. Dillon & Co., Inc.)

For more data circle No. 49 on postcard, p. 109

Die Heads

Geometric die heads now available convert from either outside trip to inside trip by a few minor adjustments. Inside trip is for jobs requiring an accurate length of thread from the end of the workpiece. This makes it possible to cut accurate length threads regardless of chucking or workpiece location.

Ceramic engineers examine new LC-R Silica Brick roof.

20% LONGER ROOF LIFE with LC-R Silica Brick

A large western steel company reports that installation of LC-R Super Duty Silica Brick increased their open hearth roof life by 20% over a one-year period. And in comparison with the next best refractory, LC-R Silica Brick averaged 13% more heats to the first patch. This is a remarkable record—another instance where Porter products help keep the refractory cost per ton down.

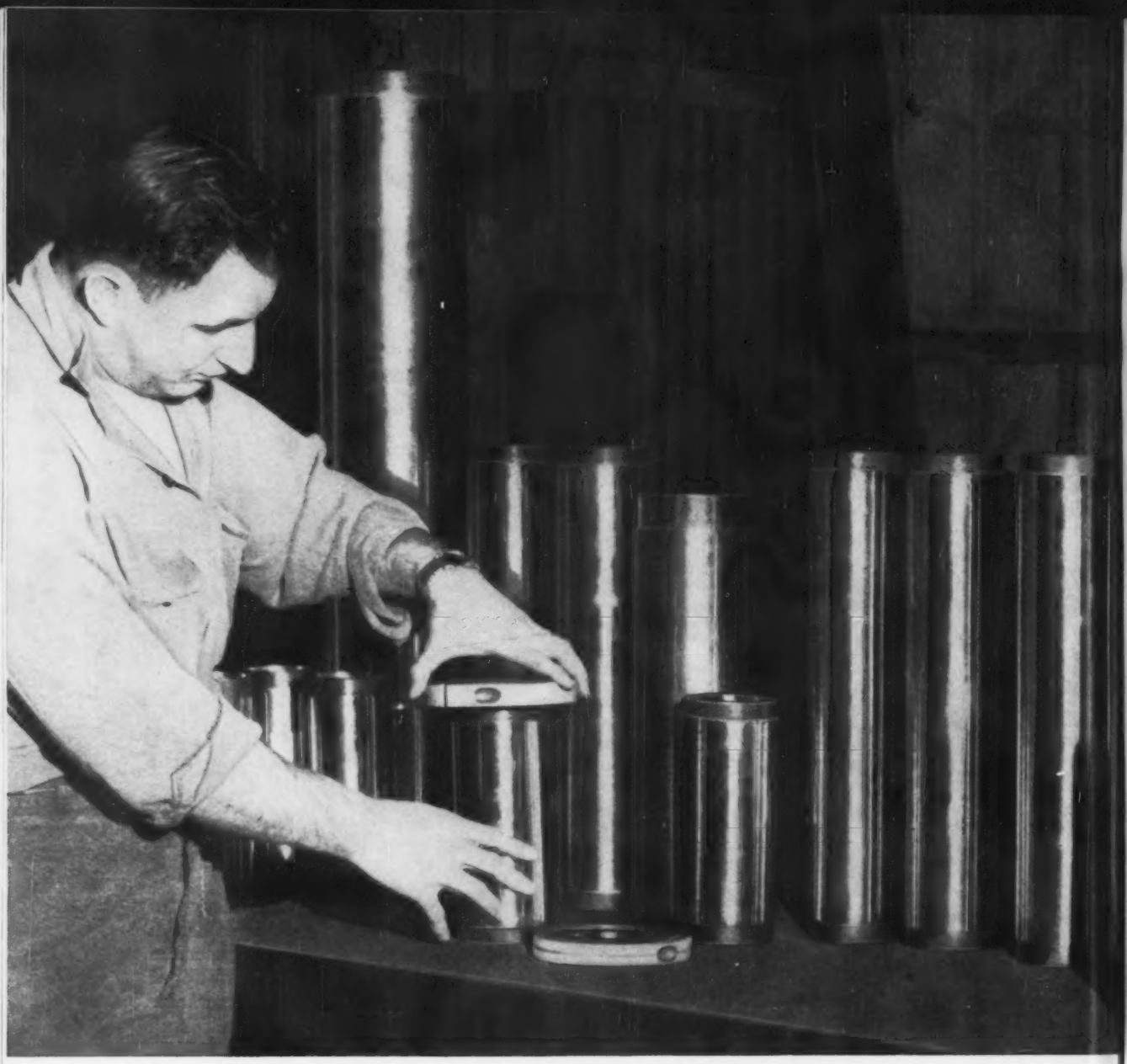
THE REASON: LC-R Silica Brick is composed of carefully selected raw materials, and is under strict quality control through every step of its manufacture. The result is a stable product with uniform characteristics and consistent quality. Users depend on it to perform with a minimum of variation in service.

For further information write to *Laclede-Christy Works, Refractories Division, H. K. Porter Company, Inc., Porter Building, Pittsburgh 19, Pa. In Canada, H. K. Porter Company (Canada) Ltd., Guelph, Ont.*

REFRACTORIES PORTER DIVISION

H.K. PORTER COMPANY, INC.

DIVISIONS: Connors Steel, Delta-Star Electric, Disston, Forge & Fittings, Leschen Wire Rope, Mouldings, National Electric, Riverside-Alloy Metal, Thermoid, Vulcan-Kidd Steel, H. K. Porter Company (Canada) Ltd.



WHO FORGES THE TOUGH ONES? . . . and machines and chrome plates them, too?

In producing the actuator cylinders shown above, we melted the steel, forged and precision machined the cylinders, and then chrome plated the bore to provide a wear-resistant surface. National Forge did the entire job—including final honing to an 8 RMS finish tolerance ±.001. Our extensive chrome plating work, a specialty of the National Forge Company, made it possible to complete the *unusual* requirements in this tough job, from beginning to end, all at a single responsible source.

If you have an unusually tough forging, machining, or finishing job—call National Forge.

NATIONAL FORGE COMPANY
IRVINE, WARREN COUNTY, PA.

For more information on "the tough ones," and the machinery that makes them "best"—write for Bulletin NFO-59-01.

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ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
CHATTANOOGA 2, TENN.

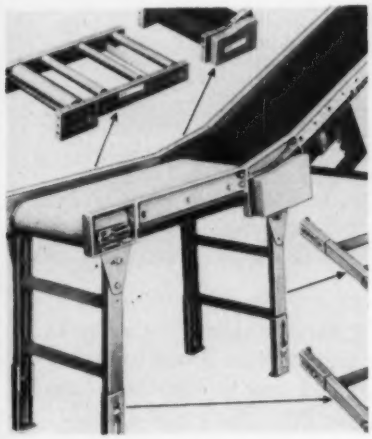
NEW EQUIPMENT

The inside trip always references from the workpiece end. Conversion to outside trip is via a simple adjustment or by removing the inside trip completely. This converts it to a conventional sleeve operated die head. (Geometric-Horton.)

For more data circle No. 50 on postcard, p. 109

Conveyor Components

Standardized, pre-engineered conveyor components can be quickly, easily assembled into custom belt conveyors. Assembly requires no special training. Special tools aren't necessary. Even unskilled personnel can erect level, inclining or declining roller bed belt conveyors of any



desired length. Belt widths are 10, 14, 18 or 22 in. Components include: straight intermediate sections, top curves, feeder sections, drives, take-ups, belts, idlers, floor supports and ceiling hangers. (Alvey-Ferguson Co.)

For more data circle No. 51 on postcard, p. 109

Height Gage

New height checking units eliminate chatter and other vibration in transferring dimensions set with height indicators, riser blocks, gage blocks, etc. They provide low cost-per-inch height setting and transfer. Utilizing lightweight aluminum, tapered-box construction, the uprights provide rigidity and stability in supporting any dial test indicator, in

CONTROL!

Ever figure out how much time it takes to jockey a big work-piece into exact position for forging, machining or some other operation?

You can cut that time substantially by operating the crane *from the floor* with FEMCO CRANE CONTROLS.

Femco Controls operate over existing power circuits, by employing a carrier system. Control stations may be located at fixed points, or mounted on wheels to be moved around as desired.

You can have a system by which all crane movements are controlled by cranemen permanently stationed on the floor, or a system which permits the man on the floor to take control for the last few moments when positioning becomes critical.

Wherever there is an overhead crane, there is a strong probability that FEMCO CRANE CONTROLS will more than pay their way through the time they save.

For full information, write to FEMCO, INC., IRWIN, PA.

Femco
COMMUNICATION AND CONTROL SYSTEMS FOR MODERN INDUSTRY

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BACKED BY A HALF CENTURY OF EXPERIENCE

- **Sizes up to 9/16"...**

  . . . down to almost the size of a human hair, in low carbon and medium low carbon steels.

- **Wire of many finishes**

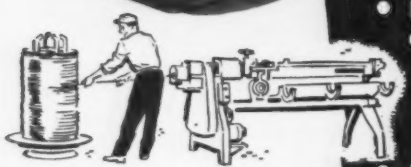
  the right wire for the job—coppered, tinned, bright, galvanized and other finishes to fit your production needs.

- **Better forming and workability**

  Continental Wire is available in almost any temper and analysis in low and medium low carbon steels for your particular forming jobs.

- **Metallurgical service**

  Thousands of case histories provide unsurpassed resources for developing a practical solution to your wire problems.



ECONO-COIL—Reduces scrap loss up to 90 percent. Saves material handling time. The Econo-Coil gives you continuous length wire coils of 2000# to 3000# catchweight, in sizes from 12 gage through ½" diameter. Shipped on returnable Econo-Coil reels.

LEVERPAK—Mechanizes your wire handling, protects wire against moisture, dirt and handling damage. LEVERPAK permits long uninterrupted runs of 500# to 650#, depending on wire sizes. Saves scrap, downtime, stores easily.

SPECIAL SHAPES—D-shaped, V-shaped, oval, half-oval, half-round, square, rectangular, triangular, keystone-shaped and others. Saves fabricating and machining costs.

Chances are you have a problem right now that we can help you solve—with Wire. Call us.

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STEEL CORPORATION • KOKOMO, INDIANA

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PRODUCERS OF Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special shaped wire. Also Welded Wire Reinforcing Fabric, Nails, Continental Chain Link Fence, and other products.

NEW EQUIPMENT

any position. Sturdy bases with hardened and lapped graphitic steel wear pads provide smooth, easy movement. Two-piece sliding heads permit quick rough settings; fine adjustments can be securely clamped.

Units are particularly suitable for use with high-amplification indicators. Three standard sizes are available: 24, 36 and 48 inches high. (Brown & Sharpe Mfg. Co.)

For more data circle No. 52 on postcard, p. 109

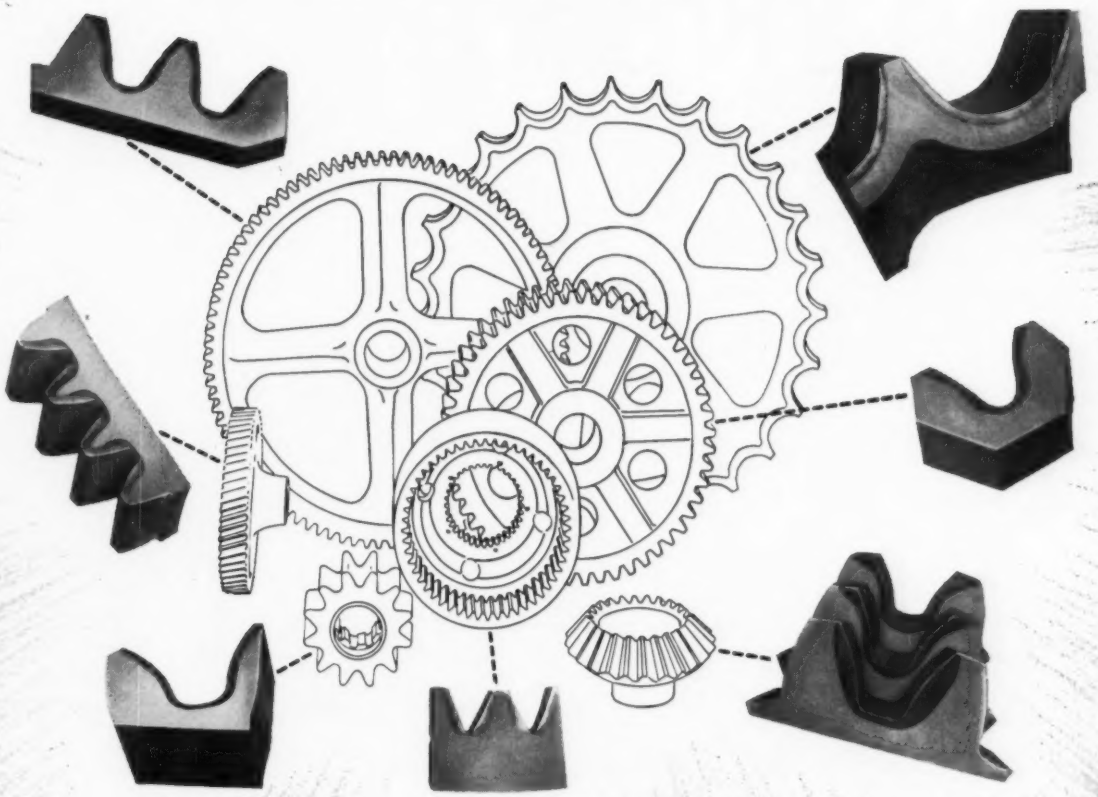
Milling Table Feed

Designed for easy installation, this power attachment converts rotary tables from hand to power feed in less than one minute. The attachment has variable speed control.

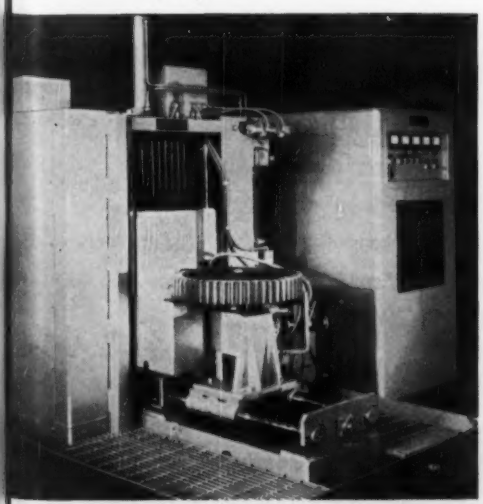
Thus the table can run at proper milling speeds. Also included is a forward and reverse switch. (M & M Tool Mfg. Co.)

For more data circle No. 53 on postcard, p. 109

PATTERNS FOR IMPROVED GEAR PERFORMANCE



Magnethermic Induction Scanner Heat Treats 6" to 60" Diameter Gears at... SURPRISINGLY LOW COST



"Tooth—by—Tooth Gets to the Root"

This Magnethermic Induction Gear Machine scans each tooth.

All kinds of savings with this Magnethermic method . . . low power and limited initial investment. Improved physical properties, particularly in the critical root zone, in many cases allow use of smaller gears or change-over from expensive alloy steels to plain carbon grades.

Distortion minimized with only a small part of the gear heat affected; no over-all compressive forces.

Flexibility of scanning makes inductors applicable to varying face widths, machine adaptable to many gear types, plus sprockets.

With automatic indexing, attention is confined to loading and unloading . . . cumulative positioning errors are eliminated.

These advantages have been proved in actual installations.

For estimate, quotation or engineering evaluation, send prints or outline your requirements in a letter.

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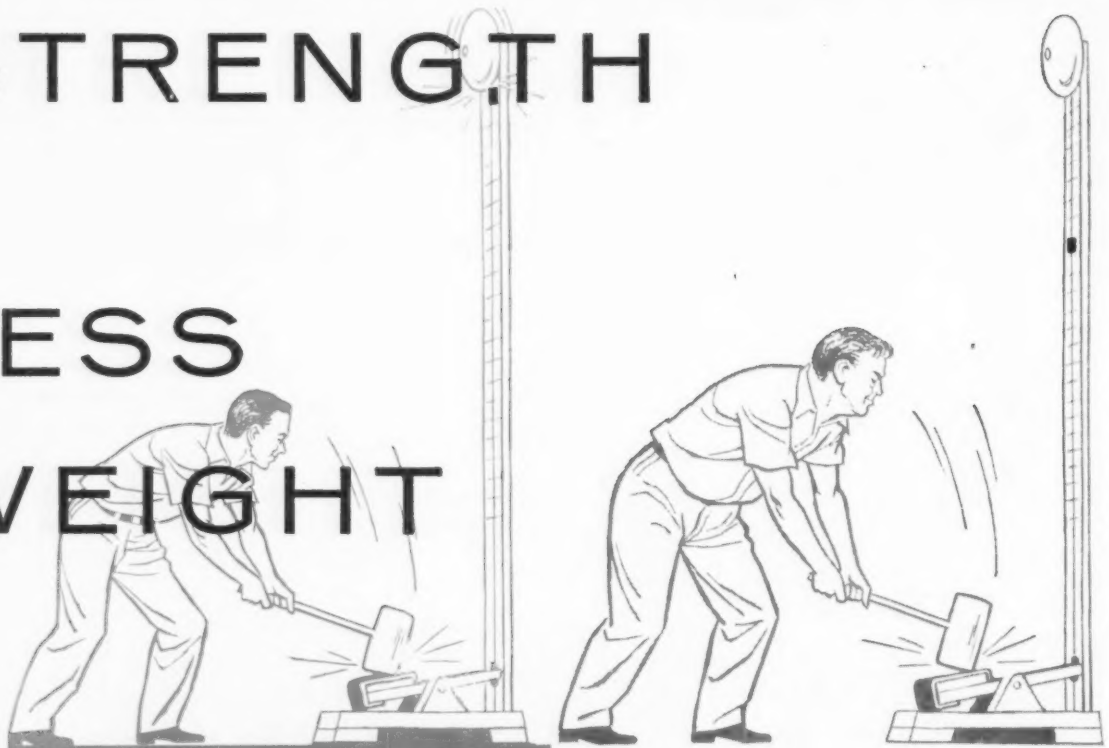
MORE STRENGTH

LESS WEIGHT



specify

A. W. DYNALLOY

A. W. DYNALLOY Steel provides higher strength per unit of weight . . . lets you cut weight in fabricated products.

Specify DYNALLOY and realize these additional advantages: weldability, easy formability and resistance to corrosion and impact. In products where high strength and low weight are desirable, DYNALLOY will provide you with a means to higher quality production . . . lower costs . . . increased profits. Call your Alan Wood Representative today! He's always available and ready to help.

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The Iron Age Summary

Panic Creeps Into Steel Market

Costly conversion deals indicate desperate straits of some steel users.

Probable freight car shortage injects a new threat into market scramble.

▪ A note of panic is creeping into the steel market. More steel users are talking to the mills about lining up ingots and slabs for conversion to sheet and strip.

This is a costly arrangement for the steel buyer and represents a desperation move on his part. It usually involves a lot of cross-hauling and extra handling that run up the final cost of the finished product.

Freight Jam Looms — Meanwhile, both the mills and their customers are running into still another problem: The probability of a freight car shortage.

Says one traffic authority: "Within two weeks we'll be in desperate condition." The mills are rapidly reaching the point where they must ship by whatever means happens to be at hand. The boom in steel demand has also showed up a truck shortage. This situation is expected to worsen in the month ahead.

Backlogs Are High—Order backlogs at some mills have hit an all-time high. Unshipped orders at one company have more than doubled since the start of the year. "This is the worst binge we've ever had," comments a leading steel man.

The logjam is worst in flat-rolled products — hot- and cold-rolled sheet, terneplate, enameling sheets, electrical, and galvanized sheets. For all intents and purposes these products are sold out for the first half of the year.

Product Rundown—Demand is strengthening for oil country casing and tubing, large diameter linepipe, hot- and cold-finished bars. Standard pipe, small linepipe, standard structurals and rails are still lagging. Plate and wide flange structurals are classed as "tight."

The boom in steel demand is due largely to fears of a steel strike at mid-year. Steel users are trying to rebuild their inventories as a hedge against a walkout.

A Tough Problem—The worst of it is, some steel buyers may have waited too long to rebuild their stocks. The movement comes at a time of rising industrial output, and metalworking companies are chewing up more steel to keep pace with better business. This tends to nullify efforts to build up a cushion against the possibility of a steel shutdown.

More users have begun to worry about their inventory position after, as well as during, a strike. So they're placing orders for third quarter delivery on the assumption that they will be near the head of the line when a walkout has ended. The mills are warning customers that June carryovers and July orders will be the first post-strike business taken care of.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,547	2,448	2,179	1,475
Ingot Index				
(1947-1949=100)	158.6	152.4	135.7	91.8
Operating Rates				
Chicago	90.0	89.0	88.5	58.0
Pittsburgh	85.0	84.0	76.0	58.0
Philadelphia	92.0	93.0*	81.0	47.5
Valley	85.0	84.0*	59.0	44.0
West	86.0	85.0	86.0	74.0
Cleveland	87.0	84.0	84.0	35.0
Detroit	97.0	97.0*	83.0	49.0
Buffalo	102.0	102.0	78.0	39.0
South Ohio River	98.0	99.0*	89.0	52.0
South	81.0	79.0	72.0	51.5
Upper Ohio River	90.0	87.5*	81.0	63.0
St. Louis	83.0	84.0*	95.0	92.0
Aggregate	90.0	86.5	77.0	54.6

*Revised

Prices At a Glance

(Cents per lb unless otherwise noted)	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	5.967
Pig Iron (gross ton)	$66.41	$66.41	$66.41	$66.49
Scrap No. 1 hvy (Gross ton)	$43.17	$43.83	$42.50	$37.33
No. 2 bundles	$30.33	$30.33	$29.33	$28.83
Nonferrous				
Aluminum ingot	26.80	26.80	26.80	28.10
Copper, electrolytic	30.00	30.00	29.00	25.00
Lead, St. Louis	11.30	11.80	11.80	12.80
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	103.75	102.625*	99.875	95.50
Zinc, E. St. Louis	11.50	11.50	11.50	10.00

Let Buyers Share Company Views

Integrating purchasing into other management activities is essential, says Charles Steers, purchasing agent at Russell, Burdsall & Ward.

Important also, he adds, is a buying staff carefully selected and trained.

CHARLES STEERS: Purchasing can't be done in a corporate vacuum.

▪ Close integration of purchasing with other management activities is essential for purchasing to play its full part in successful business operations. That's the argument of Charles Steers, purchasing agent for Russell, Burdsall & Ward Bolt & Nut Co.

Only through continuing awareness of other phases of company operations and their interaction on purchasing decisions can the P. A. function at maximum effectiveness for his company.

Favors Hedge Buying—As an illustration, he cites his current buying practice at RB&W. Fastener sales tend to lag behind overall business recovery, and the company's sales department looks for accelerating volume into the summer months.

Inventories both of raw materials and finished goods were reduced in '58, and raw material stocks must be replenished to meet new orders and production. With a steel strike strongly indicated in the third quarter, Mr. Steers is a staunch advocate of strike hedge buying.

But he points out that strike hedge buying must allow not only for an estimated strike period itself, but also for a subsequent delay while pipelines are being refilled. Without adequate supplies to carry the company through the strike and its aftermath, the purchaser would find himself a latecomer in a tight market, under pressure from both sales and production departments.

But Not for Profit—Mr. Steers is less enthusiastic about price hedge buying, however. He concedes it is sometimes justified, but feels it is often difficult to properly appraise all the factors. And gambling on the size and timing of price increases can be very expensive in these days of high inventory costs.

Too many smaller companies, he feels, seriously handicap their operations by failing to give proper attention to purchasing activities. He argues that the purchasing department is second only to the sales force in its potential to build or damage a company's reputation. Careful selection and training of personnel are essential both to the department and to the company. And buyers must be able to speak authoritatively on matters of company policy.

Know What You Buy — Mr. Steers urges that buyers become experts in the products they buy as well as in their company's operations. Salesmen too often are unable to provide proper information about products, pricing, and deliveries. This kind of on-the-job experience and knowledge, he says, is more important than purchasing training courses.

In addition the purchasing agent must be close enough to his vendors to anticipate unusual situations before they can play hob with his delivery schedules. And he joins in the complaint that salesmen do not learn enough about their customers to give the service they should.

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45° Miter
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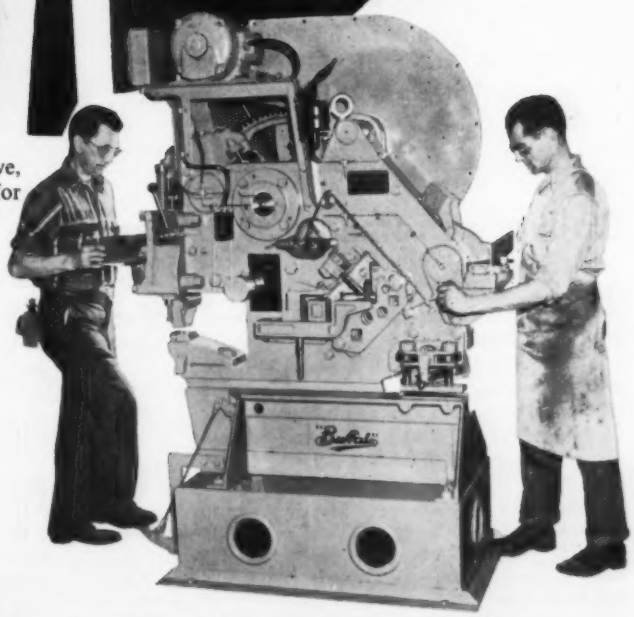

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Steel Shippers Fear Transport Jam-Up

Shipping problems are piling up as pressure mounts on rail and truck facilities.

Prospect: Mills will need longer lead times on orders, will be less able to pinpoint delivery dates.

■ Steel shipments are headed toward a possible second quarter transport bottleneck.

That's the added hazard facing consumers now trying to build up stocks. Already delivery delays are creating problems for users working from shipment to shipment.

Some buyers, counting on truck delivery, are disappointed when mills must use freight cars. But frequently the steelmakers have little choice. A truck shortage is developing in the present order upsurge.

Right now rail shipments are more dependable. But even there the storm clouds are gathering. In one large rail center, for example, the available shipping pool has shrunk from 1000 to 200 cars.

Here's what the transport uncertainty will mean to consumers from now on:

When ordering steel they will need to specify longer lead times. They may not be able to get precise shipping estimates from suppliers. And they may not be able to control the method of shipment.

Deliveries — Steel mill shipping estimates continue to stretch out in all markets. (see table). But deliveries don't tell the full story. Many products — including sheet, strip, bar, and plate—are on a quota basis and not available to new customers.

On the East Coast, for instance, regular mill buyers will get sheared mill plate in March (4 weeks delivery). But new customers (assuming mills would take their orders) couldn't expect shipment until May.

Steel Price Extras—Some steel producers feel their charges for extra operations have not kept pace with costs. There are cases, the mills say, where the extra margin is inadequate. One mill man points out the average net price on cold-rolled sheet at the mill is $139 a ton. About 10 pct represents extra charges. This percentage has been dropping from about 13 pct five years ago.

Sheet and Strip—Orders continue to flood sheet mills. Some buyers are asking producers for ingots to convert into sheet elsewhere. Sheet and strip mills are just about sold out through the first half and on a quota basis. Users in the **Midwest** are having trouble locating storage for tonnage already bought.

Bar—Both hot-rolled and cold finished bars are moving toward the tight class. **Eastern** mills are starting to run into delivery stretch-outs on special steel grades. **Chicago** producers say hot-rolled bars are a quota item for the rest of the first half. Cold finishers won't guarantee delivery on new orders before early May.

Pipe and Tubing — Oil country seamless is still available at most mills out of stock. **East Coast** producers report an order upsurge in the last two weeks. Generally mills have backlogs assuring capacity operations from March through June. Large diameter linepipe is sold out for the first half. Smaller linepipe (under 20 in.) is still plentiful. Standard pipe remains slow although inventory building is expected soon.

Reinforcing Bar — Construction users of reinforcing bar and rod have begun booking tonnages to fill summer jobs. Some who relied on foreign sources are switching to domestic mills.

Delivery Promises at a Glance

	East	Pittsburgh	Cleveland	Detroit	Chicago	West Coast
CR Carbon Sheet	8–10 wks*	6 wks	Quota	8–12 wks*	14–16 wks*	11–12 wks*
HR Carbon Sheet	6–8 wks*	6 wks	Quota	6–10 wks*	14–16 wks*	11–12 wks*
CR Carbon Strip	8–10 wks*	6 wks	Quota	8–12 wks*	14–16 wks*	11–12 wks*
HR Carbon Strip	6–8 wks*	6 wks	Quota	6–10 wks*	10–14 wks*	11–12 wks*
HR Carbon Bars	4–5 wks*	5–6 wks*	Quota	3–6 wks*	12–16 wks*	3 wks*
CF Carbon Bars	3–5 wks*	4–6 wks*	Quota	2–5 wks*	8–16 wks*	4–5 wks*
Heavy Plate	4–12 wks*	6–8 wks*			12–16 wks*	6–7 wks*
Light Plate	4 wks*	6–8 wks*	Quota		10–16 wks*	6–7 wks*
Merchant Wire	Stock	Stock	2–4 wks*		4–8 wks*	3–4 wks
Oil Country Goods	4–5 wks*	Stock	12–16 wks*		4–12 wks*	
Linepipe	3 mos*	4 mos*	8–12 wks*		4–10 wks*	4–6 wks
Buttweld Pipe	Stock	Stock	2–4 wks*	2–4 wks*	6–12 wks*	2–4 wks
Std. Structurals	3–5 wks*	2–4 wks*		2–6 wks*	8–10 wks*	4 wks
CR Stainless Sheet	3–5 wks*	1–4 wks	6–8 wks*	2–5 wks		
CR Stainless Strip	3–5 wks*	8 wks*	6–8 wks*	2–5 wks		

* Delivery promises have lengthened since 1/29/59.
† Delivery promises have shortened since 1/29/59.

COMPARISON OF PRICES

(Effective Feb. 24, 1959)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Feb. 24 1959	Feb. 17 1959	Jan. 27 1959	Feb. 25 1958
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	4.925¢
Cold-rolled sheets	6.275	6.275	6.275	6.05
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.60
Hot-rolled strip	5.10	5.10	5.10	4.925
Cold-rolled strip	7.425	7.425	7.425	7.17
Plate	5.30	5.30	5.30	5.12
Plates, wrought iron	13.55	13.55	13.55	13.15
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.30
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.00
Special coated mfg. ternes	9.90	9.90	9.90	9.55
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	6.675¢	5.675¢	5.425¢
Cold finished bar	7.65	7.65	7.65	7.30
Alloy bars	6.725	6.725	6.725	6.475
Structural shapes	5.50	5.50	5.50	5.275
Stainless bars (No. 302)	46.75	46.75	45.00	45.00
Wrought iron bars	14.90	14.90	14.90	14.45
Wire: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	7.65¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.525
Light rails	6.725	6.725	6.725	6.50
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$77.50
Slabs, rerolling	80.00	80.00	80.00	77.50
Forging billets	99.50	99.50	99.50	96.00
Alloy blooms, billets, slabs	119.00	119.00	119.00	114.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.15¢
Skelp	5.05	5.05	5.05	4.875
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	5.967¢

	Feb. 24 1959	Feb. 17 1959	Jan. 27 1959	Feb. 25 1958
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.97
Foundry, Southern Cin'ti	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.47
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	12.25	12.25	12.25	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.49
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	*$46.50*	$47.50	$45.50	$36.50
No. 1 steel, Phila. area	39.50	39.50	38.50	38.00
No. 1 steel, Chicago	*$3.50*	44.50	43.50	37.50
No. 1 bundles, Detroit	39.50	39.50	38.50	29.50
Low phos., Youngstown	49.50	49.50	47.50	38.50
No. 1 mach'y cast, Pittsburgh	51.50	51.50	51.50	50.50
No. 1 mach'y cast, Phila.	56.50	56.50	56.50	47.50
No. 1 mach'y cast, Chicago	57.50	57.50	56.50	49.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	*$43.17*	$43.83	$42.50	$37.33
No. 2 bundles	30.33	30.33	29.33	28.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.50-15.50	$14.50-15.50	$14.50	$15.38
Foundry coke, prompt	18.50	18.50	18-18.50	17.50-19
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	29.00	25.00
Copper, Lake, Conn.	30.00	30.00	29.00	25.00
Tin, Straits, N. Y.	103.75†	102.625*	99.875	95.50
Zinc, East St. Louis	11.50	11.50	11.50	10.00
Lead, St. Louis	11.30	11.30	11.80	12.80
Aluminum, virgin ingot	26.80	26.80	26.80	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composites

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Scrap Prices Weaken In Quiet Market

Limited sales at lower prices may be regarded as a minor readjustment.

Any sizable purchases should be at higher price. Mill operating rates are climbing.

■ The scrap market suffered its first setback of the year.

Price drops were minor and scattered, however, and do not indicate that a general price break has started.

Contributing to a $1 drop in some dealer openhearth grades in Pittsburgh was the starting up of five blast furnaces in the district over the past two weeks. Hot metal also played a part in a $1 drop in the Chicago market.

Most scrap prices had been coasting along at the same level for three weeks or more—an unusual occurrence in this usually volatile market. Sooner or later, prices were bound to move off dead center.

To a large extent, mills during recent weeks have been able to get by on industrial scrap, hot metal, and spot purchases of dealer grades even though their production was climbing.

Some mills that formerly needed dealer scrap when their operating rate hit 80 pct, can now go close to 90 pct before sending out scrap purchase orders. The aggregate mill operating rate is now pushing 90 pct.

Export orders, meanwhile, continue to increase. They will stabilize openhearth scrap prices in the port districts for at least another month.

Based on limited sales at lower prices in Pittsburgh and Chicago, The IRON AGE No. 1 heavy melting Composite Price is down 66¢ to $43.17.

Pittsburgh — Prices of dealer grades are bearing down on a market that remains relatively inactive. Low phos has been sold for $53, down $1 from last week. Brokers are able to buy No. 2 heavy melting at prices equal to $38 to the mill. Feeling is that prices would snap back quickly with one tonnage order.

Chicago — Despite record mill production, this market continues to show weakness. With the exception of electric furnace and foundry grades, new consumer resistance has reduced prices at both the dealer and broker level. No. 1 heavy melting, No. 2 heavy melting, and turnings are all down $1. Brokers balk at covering orders in any volume at these reduced prices, but mills are able to buy small tonnages.

Philadelphia—Local mills are not keen on placing new orders. Export, on the other hand, is picking up. One broker is developing fair-sized export orders. This business has firmed prices at present levels and is expected to keep scrap moving for the next month or so.

New York — Prices for No. 1 and No. 2 heavy melting steel rose $2 to a top of $32 for No. 1. The increase is a result of a combination of export and domestic mill buying.

Detroit—The market is coasting between industrial lists closing this week, and new orders. Consumer interest in scrap is a question mark. It's expected to be active but not overwhelming.

Cleveland — Market is treading water pending outcome of auto list sales. Brokers have largely dropped out of the market after filling the last batch of orders. Scrap generation in plants is good but collections are suffering because of bad weather.

St. Louis—Movement of scrap has slowed somewhat during the past week. Mills are reluctant to place new orders. Shoveling turnings advanced $1 to $21-$22.

Birmingham — Most scrap consumers appear to have filled their needs for the month. Dealers, still expecting higher prices as the steel operating rates rise, are building inventories.

Cincinnati—Shipments are continuing on old orders and market is in good balance. There is little new sales activity. Area mills are expected to place usual tonnage orders in March at about same price. Upriver demand has petered out because local yards can generally offer only No. 2 bundles.

Buffalo—No new sales have been made and prices are unchanged. But the market continues to have strong undertones.

Boston—Most prices are holding steady in a quiet market. Only changes are mixed cupola and heavy breakable cast, both up $1.

West Coast—The market is holding its own. Prices are steady. Some dealers are now in Japan negotiating long - term contracts. They look for substantial increases.

Houston—The market is quiet. The district mill is still working off a big inventory and there has been no step-up in foundry operations. More export is expected soon. Many dealers are keeping their eyes on a busy East Texas mill.

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says Bill Curran, Works Manager

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SCRAP PRICES *(Effective Feb. 24, 1959)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$46.00 to $47.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 dealer bundles	46.00 to 47.00
No. 1 factory bundles	52.00 to 53.00
No. 2 bundles	33.00 to 34.00
No. 1 busheling	46.00 to 47.00
Machine shop turn.	26.00 to 27.00
Shoveling turnings	30.00 to 31.00
Cast iron borings	30.00 to 31.00
Low phos. punch'gs plate	52.00 to 53.00
Heavy turnings	38.00 to 39.00
No. 1 RR hvy. melting	50.00 to 51.00
Scrap rails, random lgth.	55.00 to 56.00
Rails 2 ft and under	58.00 to 59.00
RR specialties	54.00 to 55.00
No. 1 machinery cast.	51.00 to 52.00
Cupola cast.	45.00 to 46.00
Heavy breakable cast.	43.00 to 44.00
Stainless	
18-8 bundles and solids	225.00 to 230.00
18-8 turnings	120.00 to 125.00
430 bundles and solids	125.00 to 130.00
410 turnings	50.00 to 60.00

Chicago

No. 1 hvy. melting	$43.00 to $44.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 dealer bundles	44.00 to 45.00
No. 1 factory bundles	48.00 to 49.00
No. 2 bundles	31.00 to 32.00
No. 1 busheling	43.00 to 44.00
Machine shop turn.	23.00 to 24.00
Mixed bor. and turn.	25.00 to 26.00
Shoveling turnings	25.00 to 26.00
Cast iron borings	25.00 to 26.00
Low phos. forge crops	56.00 to 57.00
Low phos. punch'gs plate, ¼ in. and heavier	52.00 to 53.00
Low phos. 2 ft and under	50.00 to 51.00
No. 1 RR hvy. melting	47.00 to 48.00
Scrap rails, random lgth.	53.00 to 54.00
Rerolling rails	65.00 to 66.00
Rails 2 ft and under	61.00 to 62.00
Angles and splice bars	56.00 to 57.00
RR steel car axles	73.00 to 74.00
RR couplers and knuckles	52.00 to 53.00
No. 1 machinery cast.	57.00 to 58.00
Cupola cast.	50.00 to 51.00
Cast iron wheels	45.00 to 46.00
Malleable	58.00 to 59.00
Stove plate	46.00 to 47.00
Steel car wheels	53.00 to 54.00
Stainless	
18-8 bundles and solids	220.00 to 225.00
18-8 turnings	120.00 to 125.00
430 bundles and solids	120.00 to 125.00
430 turnings	60.00 to 65.00

Philadelphia Area

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	36.00 to 37.00
No. 1 dealer bundles	40.00 to 41.00
No. 2 bundles	25.00 to 27.00
No. 1 busheling	40.00 to 41.00
Machine shop turn.	22.00 to 23.00
Mixed bor. short turn.	22.00 to 23.00
Cast iron borings	22.00 to 23.00
Shoveling turnings	26.00 to 27.00
Clean cast. chem. borings	30.00 to 31.00
Low phos. 5 ft and under	43.00 to 44.00
Low phos. 2 ft punch'gs	44.00 to 45.00
Elec. furnace bundles	41.00 to 42.00
Heavy turnings	35.00 to 36.00
RR specialties	45.00 to 46.00
Rails 18 in and under	59.00 to 60.00
Cupola cast.	38.00 to 42.00
Heavy breakable cast.	42.00 to 43.00
Cast iron car wheels	44.00 to 45.00
Malleable	67.00 to 68.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$40.00 to $41.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 dealer bundles	40.00 to 41.00
No. 2 bundles	26.00 to 27.00
Machine shop turn.	20.00 to 21.00
Shoveling turnings	22.00 to 23.00
Cast iron borings	20.00 to 21.00
Low phos. 18 in. and under	48.00 to 49.00
Rails, random length	50.00 to 51.00
Rails, 18 in. and under	57.00 to 58.00
No. 1 cupola cast.	45.00 to 46.00
Hvy. breakable cast.	40.00 to 41.00
Drop broken cast.	49.00 to 50.00

Youngstown

No. 1 hvy. melting	$47.00 to $48.00
No. 2 hvy. melting	38.00 to 39.00
No. 1 dealer bundles	47.00 to 48.00
No. 2 bundles	32.00 to 33.00
Machine shop. turn.	20.50 to 21.50
Shoveling turnings	20.50 to 21.50
Low phos. plate	49.00 to 50.00

Cleveland

No. 1 hvy. melting	$43.50 to $44.50
No. 2 hvy. melting	35.50 to 36.50
No. 1 dealer bundles	43.50 to 44.50
No. 1 factory bundles	46.00 to 47.00
No. 2 bundles	29.50 to 30.50
No. 1 busheling	43.50 to 44.50
Machine shop turn.	16.50 to 17.50
Mixed bor. and turn.	21.50 to 22.50
Shoveling turnings	21.50 to 22.50
Cast iron borings	21.50 to 22.50
Cut structural & plates, 2 ft & under	51.00 to 52.00
Drop forge flashings	43.50 to 44.50
Low phos. punch'gs plate	44.50 to 45.50
Foundry steel, 2 ft & under	44.00 to 45.00
No. 1 RR hvy. melting	48.00 to 49.00
Rails 2 ft and under	59.00 to 60.00
Rails 18 in. and under	60.00 to 61.00
Steel axle turnings	27.00 to 28.00
Railroad cast.	54.00 to 55.00
No. 1 machinery cast.	52.00 to 53.00
Stove plate	49.00 to 50.00
Malleable	67.00 to 68.00
Stainless	
18-8 bundles	215.00 to 220.00
18-8 turnings	115.00 to 120.00
430 bundles	120.00 to 125.00

Buffalo

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 busheling	41.00 to 42.00
No. 1 dealer bundles	41.00 to 42.00
No. 2 bundles	30.00 to 31.00
Machine shop turn.	19.00 to 20.00
Mixed bor. and turn.	21.00 to 22.00
Shoveling turnings	23.00 to 24.00
Cast iron borings	19.00 to 20.00
Low phos. plate	45.00 to 46.00
Structurals and plate 2 ft and under	49.00 to 50.00
Scrap rails, random lgth.	51.00 to 52.00
Rails 2 ft and under	61.00 to 62.00
No. 1 machinery cast.	51.00 to 52.00
No. 1 cupola cast.	47.00 to 48.00

St. Louis

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 dealer bundles	40.00 to 41.00
No. 2 bundles	28.00 to 29.00
Machine shop turn.	19.00 to 20.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	22.00 to 23.00
No. 1 RR hvy. melting	46.00 to 47.00
Rails, random lengths	49.00 to 50.00
Rails, 18 in. and under	54.00 to 55.00
Angles and splice bars	50.00 to 51.00
RR specialties	48.50 to 49.50
Cupola cast.	50.00 to 51.00
Heavy breakable cast.	40.00 to 41.00
Cast iron brake shoes	37.00 to 38.00
Stove plate	43.00 to 44.00
Cast iron car wheels	45.00 to 46.00
Rerolling rails	61.50 to 62.50
Unstripped motor blocks	41.00 to 42.00

Birmingham

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	23.00 to 24.00
No. 1 busheling	33.00 to 34.00
Machine shop turn.	24.00 to 25.00
Shoveling turnings	25.00 to 26.00
Cast iron borings	14.00 to 15.00
Electric furnace bundles	39.00 to 40.00
Elec. furnace, 3 ft & under	36.00 to 37.00
Bar crops and plate	43.00 to 44.00
Structural and plate, 2 ft.	42.00 to 43.00
No. 1 RR hvy. melting	38.00 to 39.00
Scrap rails, random lgth.	44.00 to 45.00
Rails, 18 in. and under	51.00 to 52.00
Angles and splice bars	44.00 to 45.00
Rerolling rails	56.00 to 57.00
No. 1 cupola cast.	53.00 to 54.00
Stove plate	53.00 to 54.00
Cast iron car wheels	42.00 to 43.00
Unstripped motor blocks	40.00 to 41.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	28.00 to 29.00
No. 2 dealer bundles	20.00 to 21.00
Machine shop turnings	12.00 to 13.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	16.00 to 17.00
Clean chem. cast. borings	23.00 to 25.00
No. 1 machinery cast.	37.00 to 38.00
Mixed yard cast.	33.00 to 34.00
Heavy breakable cast.	32.00 to 33.00
Stainless	
18-8 prepared solids	190.00 to 195.00
18-8 turnings	80.00 to 85.00
430 prepared solids	80.00 to 85.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 dealer bundles	39.00 to 40.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	37.00 to 38.00
Drop forge flashings	36.00 to 37.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	17.00 to 18.00
Heavy breakable cast.	36.00 to 37.00
Mixed cupola cast.	43.00 to 44.00
Automotive cast.	48.00 to 49.00
Stainless	
18-8 bundles and solids	210.00 to 215.00
18-8 turnings	100.00 to 105.00
430 bundles and solids	105.00 to 110.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	17.00 to 18.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	9.00 to 10.00
Shoveling turnings	11.00 to 12.00
Clean cast. chem. borings	18.00 to 19.00
No. 1 machinery cast.	33.00 to 34.00
Mixed cupola cast.	33.00 to 34.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	29.00 to 30.00

San Francisco

No. 1 hvy. melting	$32.00 to $34.00
No. 2 hvy. melting	30.00 to 32.00
No. 1 dealer bundles	28.00 to 30.00
No. 2 bundles	.... 22.00
Machine shop turn.	.... 15.00
Cast iron borings	.... 15.00
No. 1 cupola cast.	44.00 to 45.00

Los Angeles

No. 1 hvy. melting	.... $36.00
No. 2 hvy. melting	.... 34.00
No. 1 dealer bundles	.... 33.00
No. 2 bundles	.... 18.00
Machine shop turn.	.... 15.00
Shoveling turnings	.... 17.00
Cast iron borings	.... 17.00
Elec. furn. 1 ft and under (foundry)	.... 47.00
No. 1 cupola cast.	.... 43.00

Seattle

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	32.00 to 33.00
No. 2 bundles	.... 22.00
No. 1 cupola cast.	.... 36.00
Mixed yard cast.	.... 36.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars:

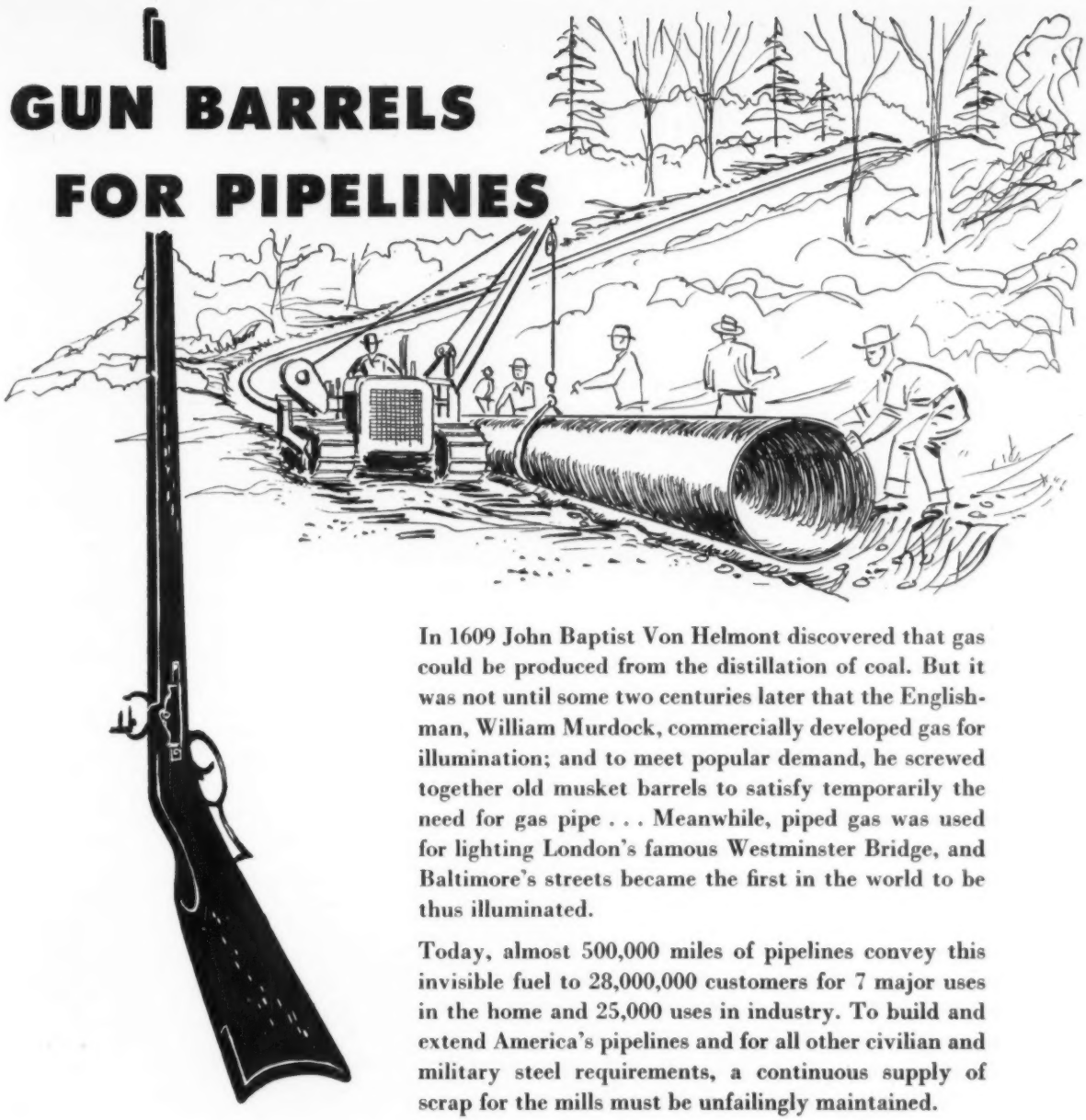
No. 1 hvy. melting	.... $34.50
No. 2 hvy. melting	.... 30.50
No. 1 dealer bundles	.... 34.50
No. 2 bundles	.... 25.00
Mixed steel scrap	.... 26.50
Bush., new fact., prep'd	.... 34.50
Bush., new fact., unprep'd	.... 28.50
Machine shop turn.	.... 13.00
Short steel turn.	.... 17.00
Mixed bor. and turn.	.... 13.00
Rails, rerolling	.... 37.00
Cast scrap	.... 45.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	.... $35.00
No. 2 hvy. melting	.... 32.00
No. 2 bundles	.... 22.50
Machine shop turn.	.... 15.00
Shoveling turnings	.... 19.00
Cut structural plate 2 ft & under	$44.00 to 45.00
Unstripped motor blocks	31.00 to 32.00
Cupola cast.	43.00 to 44.00
Heavy breakable cast.	26.50 to 27.50

GUN BARRELS FOR PIPELINES



In 1609 John Baptist Von Helmont discovered that gas could be produced from the distillation of coal. But it was not until some two centuries later that the Englishman, William Murdock, commercially developed gas for illumination; and to meet popular demand, he screwed together old musket barrels to satisfy temporarily the need for gas pipe . . . Meanwhile, piped gas was used for lighting London's famous Westminster Bridge, and Baltimore's streets became the first in the world to be thus illuminated.

Today, almost 500,000 miles of pipelines convey this invisible fuel to 28,000,000 customers for 7 major uses in the home and 25,000 uses in industry. To build and extend America's pipelines and for all other civilian and military steel requirements, a continuous supply of scrap for the mills must be unfailingly maintained.

For the purchase or sale of iron or steel scrap . . .

phone or write "Your Chicago Broker"

M. S. KAPLAN COMPANY

231 S. LaSalle St., Chicago

Telephone ANdover 3-3900

Are Reds Bluffing On Aluminum?

Here's the evidence that now makes the trade think Russia is weak on the aluminum front.

Many believe she can do some damage, but can't sustain a full-scale aluminum trade war.

■ Many who pushed the panic button at the first signs of Russian activity in Free World aluminum markets are resetting the switch.

Now, thinking in both industry and government is: Maybe Free World producers are stronger than had been thought. And maybe the Reds aren't as flush with aluminum as had been supposed.

January Was Tops—A combination of factors has been building up to this. The final push on the public opinion pendulum came late last week when the Aluminum Assn. reported (for the second month in a row) a new production record. The 156,708 tons turned out in January topped the 152,301 tons made the previous month, and both outstrip the 151,624 tons made in July 1956.

In 1956, the industry hit the crest of a buying wave preceding a possible strike. Every pot was bubbling. Now, U. S. producers are working only a little more than 80 pct of capacity. And the strike threat is undefined and causing no undue buying flurry.

On the other side of the curtain a speech by a top Red (The IRON AGE, Feb. 12, Page 148) that Russia is short of aluminum sent observers scrambling to reappraise the situation. They found that Russian tonnages moved in Free World markets last year were small. Their impact came mostly from careful selection of price and the right time and place to sell.

Russian Ore Is Poor—A further flashback indicates the Reds have perhaps the worst ore in the world inside their borders. They get high grade stuff from Hungary. And they have developed techniques that yield by-products from the ore, making it more economical to treat. And they have a crash program. But observers say Russia could not maintain a full-scale aluminum war for very long—at least not yet.

Also coloring the picture a rosy hue are two recent government releases. The Aluminum and Magnesium Div., Business and Defense Services Administration, Dept. of Commerce, predicts the output in the U. S. in this quarter will hit an all-time high. Yet this is likely to be the worse period in the year.

And a recent statement by the Senate Interior Committee: "As a group nonferrous base metals present the weakest link in the Soviet mineral economy. . . ."

Nickel

The possibility that Cuban industry will be nationalized is being mentioned again. Rep. Adam Clayton Powell (D., N. Y.), says Cuban leader Fidel Castro told him he did not like the contract that would let Freeport Nickel Co. develop its Cuban nickel and cobalt property. If Castro acts against Freeport, every U. S. interest on the island is threatened.

Actually Freeport has no special concessions. It gets a tax break under Cuban Law Decree 1038. But this aims to lure new industry, and applies to any company which qualifies.

Observers point out the new Cuban government has some king-sized financial headaches. Castro has obligations but no money. The question is whether Castro really wants to nationalize Cuban industry or is just using this threat as a club to boost taxes.

Zinc

Galvanizing regained its position as the No. 1 zinc market in 1958. While its main challenger and leader in 1957—diecastings—were falling off, use of zinc in galvanizing rose to 372,000 tons, from 367,757 tons in 1957.

The zinc industry looks for a good year in 1959. It brought the galvanizing boom along into 1959. And the American Die Casting Institute predicts an improvement in use of zinc for diecastings. The industry is likely to crowd, but not hit, a million tons.

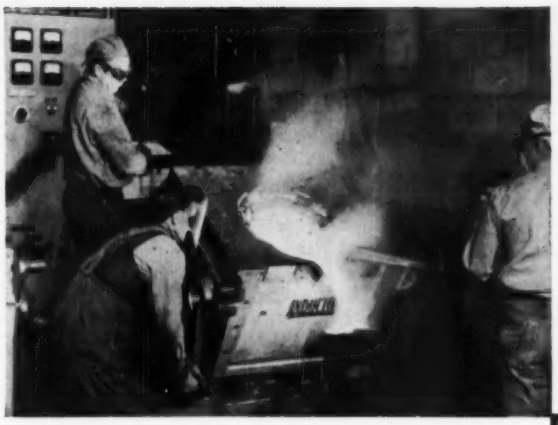
Tin prices for the week: Feb. 18—102.75; Feb. 19—103.25; Feb. 20—103.625; Feb. 23—Holiday; Feb. 24—103.75.*

* Estimate.

Primary Prices

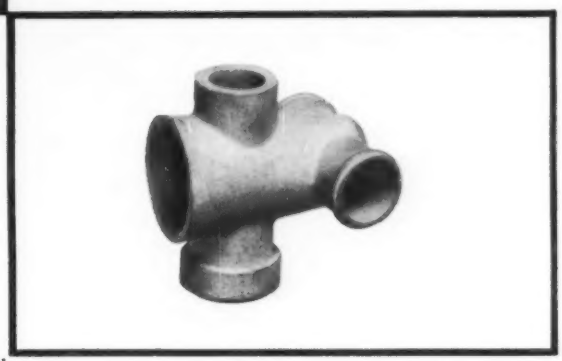
(cents per lb)	current price	last price	date of change
Aluminum pig	24.70	24.00	8/1/58
Aluminum Ingot	26.80	26.10	8/1/58
Copper (E)	30.00	29.00	2/3/59
Copper (CS)	30.50	30.00	2/16/59
Copper (L)	30.00	29.00	2/3/59
Lead, St. L.	11.30	11.80	2/11/59
Lead, N. Y.	11.50	12.00	2/11/59
Magnesium Ingot	36.00	34.00	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/58
Titanium sponge	162-182	185-205	11/3/58
Zinc, E. St. L.	11.50	11.00	11/7/58
Zinc, N. Y.	12.00	11.50	11/7/58

ALUMINUM: 99% Ingot frt allwd. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colbourne, Canada. ZINC: prime western. Tin: See above; Other primary prices, pg. 140.



INDUCTOMELTING MEANS*

FEWER CASTING REJECTS



The application of INDUCTOMELTING in ferrous and non-ferrous foundries assures fewer faulty castings. Several related factors contribute to this reduction of rejects . . . such as Inducto's high melting speeds, precise temperature control, electromagnetic stirring action and virtual freedom from gases and slag particles.

Consider the effect of these characteristics on your castings. The melting speeds are so high that oxidation and metal losses are insignificant. Correct pouring temperatures are always achieved—easily—and heat after heat can be exactly duplicated. You maintain close control over melt history. Critical alloys are not lost due to prolonged or excessive heating. Accurate control of alloy chemistry is assured since losses are negligible, even in the more easily oxidized metals. All melts are homogeneous because of the electromagnetic stirring action induced by the furnace. Carbon is not a problem and gas content can be held to a bare minimum.

These factors clearly explain why INDUCTOMELTING contributes to a sharp reduction in casting rejects. Add these savings to low metal losses, efficient operation and faster production and you can readily see how modern Inducto melting equipment has saved more than its cost in many installations over a short period of time.

Write for complete details as outlined in Bulletin 70. Inductotherm Corporation, 412 Illinois Ave., Delanco , N. J.

**INDUCTOMELTING is high-frequency induction melting PLUS the additional advantages of INDUCTO design features and engineering techniques.*

INDUCTOTHERM

INDUCTO . . . the mark of modern melting

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship pt., frt. allowed)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.032	.081	.136	.250-3
1100, 3003	45.7	43.8	42.8	43.3
5052	53.1	48.4	46.9	46.0
6061-0	50.1	45.7	43.9	44.9

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6–8	42.7–44.2	51.1–54.8
12–14	42.7–44.2	52.0–56.5
24–26	43.2–44.7	62.8–67.5
36–38	46.7–49.2	86.9–90.5

Screw Machine Stock—2011-T-3

Size"	¼	⅜–⅝	¾–1	1¼–1½
Price	62.0	61.2	59.7	57.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.411	$1.884	$2.353	$2.823
.024 gage	1.762	2.349	2.937	3.524

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type→ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade		67.9	69.0	77.9	108.1
AZ31B Spec.		93.3	95.7	108.7	171.3
Tread Plate		70.6	71.7		
Tooling Plate	73.0				

Extruded Shapes

factor→	6–8	12–14	24–26	36–38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	126	106	128
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	120	105	121
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	54.13	.....	51.36	54.32
Brass, Yellow	47.40	47.94	47.34	50.81
Brass, Low	50.13	50.67	50.07	53.44
Brass, R L	51.09	51.63	51.03	54.40
Brass, Naval	52.08	.....	45.89	55.49
Muntz Metal	50.15	.....	45.46	.....
Comm. Bz.	52.14	53.14	52.54	55.66
Mang. Bz.	55.82	.....	49.42	.....
Phos. Bz. 5%	73.82	.....	74.30	.....

Free Cutting Brass Rod 31.99

TITANIUM

(Base prices, f.o.b. mill)

Sheet and strip, commercially pure, $6.90-$7.40; alloy, $14.35; Plate, HR, commercially pure, $5.00-$5.75; alloy, $7.75-$8.50. Wire, rolled and/or drawn, commercially pure, $5.50-$6.00; alloy, $8.00-$9.50; Bar, HR or forged, commercially pure, $4.25-$4.65; alloy, $4.25-$7.15; billets, HR, commercially pure, $3.55-$4.10; alloy, $3.55-$5.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium aluminum 5% Be, Dollar per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.45
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic basis... $ 1.31
Cobalt, 97-99% (per lb)... $1.75 to $1.82
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 35.00 to 42.00
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9%, dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz.... $75 to $85
Lithium, 98% ..... $11.00 to $14.00
Magnesium, sticks, 100 to 500 lb.... 59.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $218 to $221
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz.. $16 to $18
Platinum, dollars per troy oz... $67 to $70
Rhodium ..... $120.00 to $125.00
Silver ingots (¢ per troy oz.)..... 90.375
Thorium, per kg. $43.00
Vanadium ..... $ 3.45
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 29.00
- No. 120 ..... 28.00
- No. 123 ..... 27.00

80-10-10 ingot
- No. 305 ..... 33.25
- No. 315 ..... 31.25

88-10-2 ingot
- No. 210 ..... 42.25
- No. 215 ..... 38.00
- No. 245 ..... 33.75

Yellow ingot
- No. 405 ..... 24.00

Manganese bronze
- No. 421 ..... 25.75

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.75-25.00
- 0.60 copper max. 24.50-24.75

Piston alloys (No. 122 type).. 24.25-25.25
No. 12 alum. (No. 2 grade).... 21.50-22.00
108 alloy 22.00-22.50
195 alloy 25.00-26.00
13 alloy (0.60 copper max.)... 24.25-24.75
AXS-679 (1 pct zinc) 21.75-22.25

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 22.50-23.50
Grade 2—92-95% 21.25-22.25
Grade 3—90-92% 20.25-21.25
Grade 4—85-90% 17.50-18.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¾
Yellow brass	19¾	18
Red brass	23	22¼
Comm. bronze	23⅞	23⅛
Mang. bronze	18⅝	17⅝
Free cutting rod ends.	19¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 27¼
No. 2 copper wire 25¾
Light copper 23½
*Refinery brass 25¼
Copper bearing material 24½
* Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 27¼
No. 2 copper wire 25¾
Light copper 23½
No. 1 composition 21½
No. 1 comp. turnings 20½
Hvy. yellow brass solids 15¾
Brass pipe 17¼
Radiators 17½

Aluminum

Mixed old cast. ..... 12 —13
Mixed new clips ..... 15 —16
Mixed turnings, dry ..... 13 —14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 24 —24½
No. 2 copper wire ..... 22 —22½
Light copper ..... 20 —20½
Auto radiators (unsweated). 14¼—14¾
No. 1 composition ..... 17¾—18¼
No. 1 composition turnings.. 16¾—17¼
Cocks and faucets ..... 14½—15
Clean heavy yellow brass ... 12¾—13¼
Brass pipe ..... 14½—15
New soft brass clippings .... 15 —15½
No. 1 brass rod turnings .... 12½—13

Aluminum

Alum. pistons and struts .... 6 — 6½
Aluminum crankcases ..... 9½—10
1100 (2s) aluminum clippings 13 —13½
Old sheet and utensils ..... 9½—10
Borings and turnings ..... 6 — 6½
Industrial castings ..... 9½—10
2020 (24S) clippings ..... 11 —11½

Zinc

New zinc clippings ..... 4¾— 5¼
Old zinc ..... 3½— 3¾
Zinc routings ..... 2¼— 2½
Old die cast scrap ..... 2 — 2¼

Nickel and Monel

Pure nickel clippings 52-54
Clean nickel turnings 37-40
Nickel anodes 52-54
Nickel rod ends 52-54
New Monel clippings 30-32
Clean Monel turnings 30-32
Old sheet Monel 26-28
Nickel Silver clippings, mixed 18
Nickel silver turnings, mixed 15

Lead

Soft scrap lead ..... 7 — 7¼
Battery plates (dry) ..... 2¼ — 2½
Batteries, acid free ..... 2 — 2¼

Miscellaneous

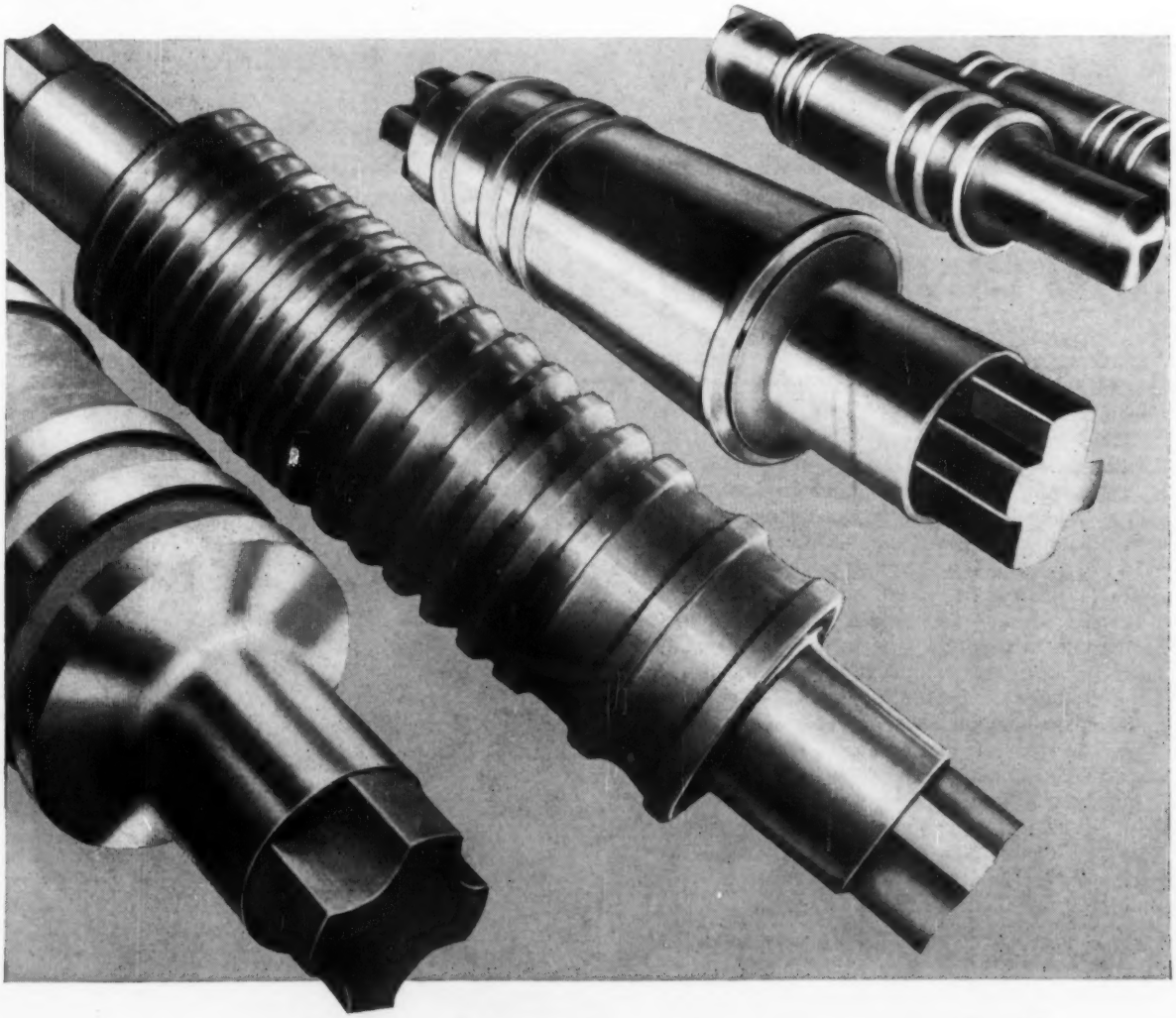
Block tin ..... 75 —76
No. 1 pewter ..... 59 —60
Auto babbitt ..... 39 —40
Mixer common babbitt ..... 9½—10
Solder joints ..... 13¼—13¾
Siphon tops 42
Small foundry type ..... 10½—10¾
Monotype ..... 10½—10¾
Lino. and stereotype ..... 9½— 9¾
Electrotype ..... 8½— 8¾
Hand picked type shells .... 6½— 7
Lino. and stereo. dross ..... 2¾— 3
Electro dross ..... 2¼— 2½

(Effective Feb. 23, 1959)

Longer service between dressings... higher output with

BIRDSBORO *ROLLS*

• Birdsboro's specialized family of steel, alloy iron, and alloy steel rolls are designed to meet the toughest of modern rolling mill requirements. New metals, new methods and advanced rolling techniques are constantly being improved through Birdsboro roll research. Your Birdsboro representative can tell you more. *Sales Department, Engineering Department and Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.



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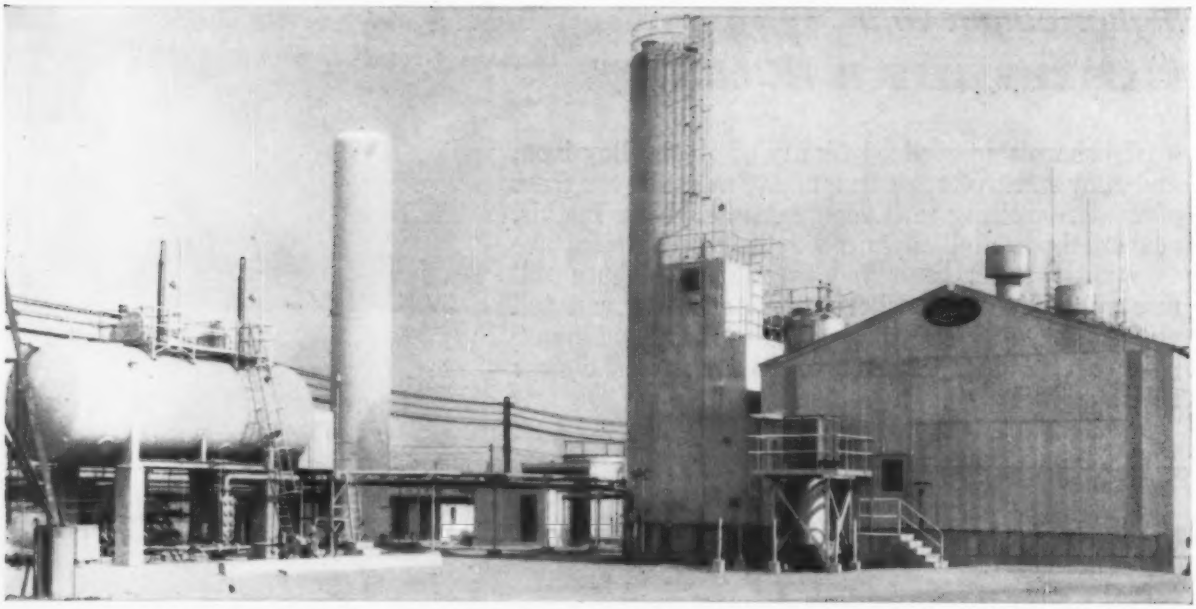
BIRDSBORO

STEEL FOUNDRY AND MACHINE CO.

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • STEEL CASTINGS • Weldments "CAST-WELD" Design • ROLLS: Steel, Alloy Iron, Alloy Steel

The exciting new J & L sets its pace . . .



This LINDE On-site Plant is located at J & L's Cleveland Works. Capacity—48,000,000 cu. ft. mo.

and LINDE helps them keep it!

LINDE's Oxygen supply system and scarfing process are geared to production requirements at Jones & Laughlin's Cleveland Works.

All oxygen demands—in the furnace and on the finishing line—are easily handled by LINDE's On-site Plant. BUT . . . intermittent demands require LINDE's flexible supply system—a reliable producing plant PLUS the ability to deliver "peak" and "back-up" requirements from a nationwide liquid oxygen producing and delivery system.

LINDE's supply system and scarfing process meet fluctuations in production as well. When demand dips the oxygen supply is immediately cut back and the LIN-DE-SURFACER Scarfing Machine is regulated or rolled off the line in a matter of minutes.

Whatever the pace set by J & L, LINDE is there right down the line helping to meet the schedule.

For further information, write Dept. I-24, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. In Canada: Linde Company, Division of Union Carbide Canada Limited.

A LIN-DE-SURFACER Scarfing Machine, like the one shown here, is used by J & L to condition steel destined for the automotive industry.

The terms "Linde," "Lin-De-Surfacer," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Linde

UNION CARBIDE

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3, R3*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Bridgeport, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3,* $114.00 *T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Ill. Franklin Park, Ill. Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1,* *C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *F3*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$113.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

(Effective Feb. 23, 1959)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Holloware Enameling *29* ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*			
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*			7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A1*	6.275 *A1*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1,Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*	6.875 *G2*							$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*	$10.40 *W5, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.

* Electrogalvanized sheets.

(Effective Feb. 23, 1959)

*7.425 at Sharon-Niles is 7.225

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.475 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7,A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3* 6.475 *T5*	9.025 *R3,R2* 8.775 *T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Ohio Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5* 9.225 *B5,P3, P8*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*					5.30 *N4*				8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Cal. Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Terrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, S12*	8.625 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				8.675 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6*	6.425 *B2*				8.675 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.675 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Feb. 23, 1959) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Steel Corp., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50								
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50								
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Fontana *K1*	+6.25		+2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50								
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

(Effective Feb. 23, 1959)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2

High-carbon chromium.. .955 D-3, D-5
Oil hardened manganese .505 O-2
Special carbon ..... .38 W-1
Extra carbon ..... .38 W-1
Regular carbon ..... .325 W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, C4, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 42.50; 1 side, 35.85.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *P5*	.....	.....	.....	.....	.....	14.75
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

COKE

	Net-Ton
Furnace, beehive (f.o.b.) Connellsville, Pa.	$14.50 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Detroit f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearney, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	34.35
Erie, Pa., f.o.b.	32.00
Cleveland, del'd	34.19
Cincinnati, del'd	32.84
St. Paul, f.o.b.	31.25
St. Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1958 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100,110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12 55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Super duty, Mo., Pa., Md., Ky.	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays, Latrobe, Pa.	163.00
Chicago District	168.00
Western Utah	183.00
California	165.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	163.00-168.00
Silica cement, net ton, bulk, Latrobe	29.75
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.	$109.00
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Balt.	103.00

Magnesite Brick

Standard, Baltimore	$140.00
Chemically bonded, Baltimore	119.00

Grain Magnesite

St. ⅜ to ½-in. grains

Domestic, f.o.b. Baltimore in bulk	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	16.60
Midwest	17.00

(Effective Feb. 23, 1959)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	.....	...	190	9.00	9.675
Atlanta *A8***	175	192	.....	214	198	8.75	9.425
Bartonville *K2***	175	192	178	214	198	9.10	9.775
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4***	177	190	172	212	196	9.00	9.70
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9 00	.....
Crawf'dsv. *M4***	175	192	.....	214	198	9.10	9.775
Donora, Pa. *A5*	173	187	.....	212	193	9.00	9.55
Duluth *A5*	173	187	.....	212	193	9 00	9.55
Fairfield, Ala. *T2*	173	187	.....	212	193	9 00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	.....	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	.....	219	203	9.10	9.775
Johnstown *B3***	173	190	177	.....	196	9.00	9.675
Joliet, Ill. *A5*	173	187	.....	212	193	9 00	9.55
Kokomo *C9*	175	189	.....	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	.....	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Monessen *P6*	.....	.....	.....	.....	193	8.65	9.325
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.60	10.1‡
Rankin, Pa. *A5*	173	187	.....	.....	193	9 00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50†
Sparrows Pt. *B3***	175	.....	.....	214	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9 30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 11-12¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12,90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12,90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	.....	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.55
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	40.28	47.21	35.22
	2½	12	54.23	63.57	47.43
	3	12	62.62	73.40	54.77
	3½	11	73.11	85.70	63.93
	4	10	97.08	113.80	85.53
National Tube	2	13	40.28	47.21	35.22
	2½	12	54.23	63.57	47.43
	3	12	62.62	73.40	54.77
	3½	11	73.11	85.70	63.93
	4	10	97.08	113.80	85.53
Pittsburgh Steel	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

METAL POWDERS

Cents per lb, minimum truckload, delivered E. of Miss. River, unless otherwise noted.

Iron Powders

Compacting Powders

Electrolytic, imported, f.o.b.	29.50 to 33.00
Electrolytic, domestic	34.50
Sponge	11.25
Atomized	11.25
Hydrogen Reduced	11.25 to 12.00
Carbonyl	88.00
Welding Powders*	8.10
Cutting and Scarfing Powders*	9.10

Copper Powders

Electrolytic, domestic	41.00
Precipitated	40.50 to 45.00
Atomized	39.80 to 48.30
Hydrogen reduced, f.o.b.	43.25
Bronze	47.20 to 51.50
Chromium, electrolytic	$5.00
Lead	19.00
Manganese, f.o.b.	42.00
Molybdenum	$3.60 to $3.95
Nickel	$1.05 to $1.03
Nickel Silver	53.50
Nickel Steel	13.00
Solder	13¢ plus metal value
Stainless Steel, 302	$1.07
Stainless Steel, 316	$1.26
Steel, atomized, prealloyed, 4600 series	14.00 plus metal value
Tin	14¢ plus metal value
Titanium, 99.25+%, per lb., f.o.b.	$11.25
Tungsten	$3.15 (nominal)

* F.O.B., shipping point.

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Bolts	Pct. Discounts 1–4 Containers	5 Containers	20,000 Lb.	40,000 Lb.
Machine				
½" and smaller x 3" and shorter	55	57	61	62
5/8" diam. x 3" and shorter	47	49½	54	55
¾" thru 1" diam x 6" and shorter	37	39½	45	46
¾" thru 1" diam. longer than 6" and 1½" and larger x all lengths	31	34	40	41
Rolled thread, ½" and smaller x 3" and shorter	55	57	61	62
Carriage, lag, plow, tap, blank, step, elevator and fitting up bolts ½" and smaller x 6" and shorter	48	50½	55	56

Note: Add 25 pct for less than container quantity. Distributor prices are 5 pct less on bolts and square nuts.

Nuts, Hex, HP reg. & hvy.	Full case or Keg price
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
C. P. Hex, reg. & hvy.	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
Hot Galv. Hex Nuts (All Types)	
¾ in. and smaller	41
Semi-finished Hex Nuts	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½

(Add 25 pct for broken case or keg quantities)

Finished	
⅞ in. and smaller	65

Rivets	Base per 100 lb
½ in. and larger	$12.85
	Pct. Off List
7/16 in. and smaller	15

Cap Screws *Discount (Packages)*

Full Finished H. C. Heat Treat

New std. hex head, packaged	Full Case
⅝" diam. and smaller x 6" and shorter	54
¾", ⅞", and 1" diam. x 6" and shorter	38
⅝" diam. and smaller x longer than 6"	..
¾", ⅞", and 1" diam. x longer than 6"	..

	C-1018 Steel Full-Finished Cartons	Bulk
¼" through ⅝" dia. x 6" and shorter	59	48
¾" through 1" dia. x 6" and shorter	45	32

Minimum quantity—¼" through ⅜" diam., 15,000 pieces; 7/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts

Plain Finish	Discount Mach. Screws	Stove Bolts
Cartons	60	60
Bulk		
Quantity		
To ¼" diam. incl. 25,000-and over	60	..
5/16 to ½" diam. incl. 15,000-200,000	60	..

Machine Screws & Stove Bolt Nuts

	Discount Hex	Square
In Cartons	16	19
Quantity		
In Bulk ⅜" diam. & smaller 25,000-and over	15	16

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Rolled elliptical, 18 in. or longer, 5000 lb lots	45.00
Electrodeposited	36.00
Brass, 80-20, ball anodes, 2000 lb or more	47.50
Zinc, ball anodes, 2000 lb lots	18.00
(for elliptical add 1¢ per lb)	
Nickel, 99 pct plus, rolled carton, 5000 lb	1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium	1.45

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	65.90
Copper sulphate, 100 lb bags, per cwt.	22.75
Nickel salts, single, 100 lb bags	36.00
Nickel chloride, freight allowed, 100 lb	45.00
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	23.70
(Philadelphia price 24.00)	
Zinc cyanide, 100 lb	60.75
Potassium cyanide, 100 lb drum N. Y.	45.50
Chromic acid, flake type, 10,000 lb or more	30.44

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.5
Chicago	140.9
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

STEEL SERVICE CENTERS

Metropolitan Price, dollars per 100 lb.

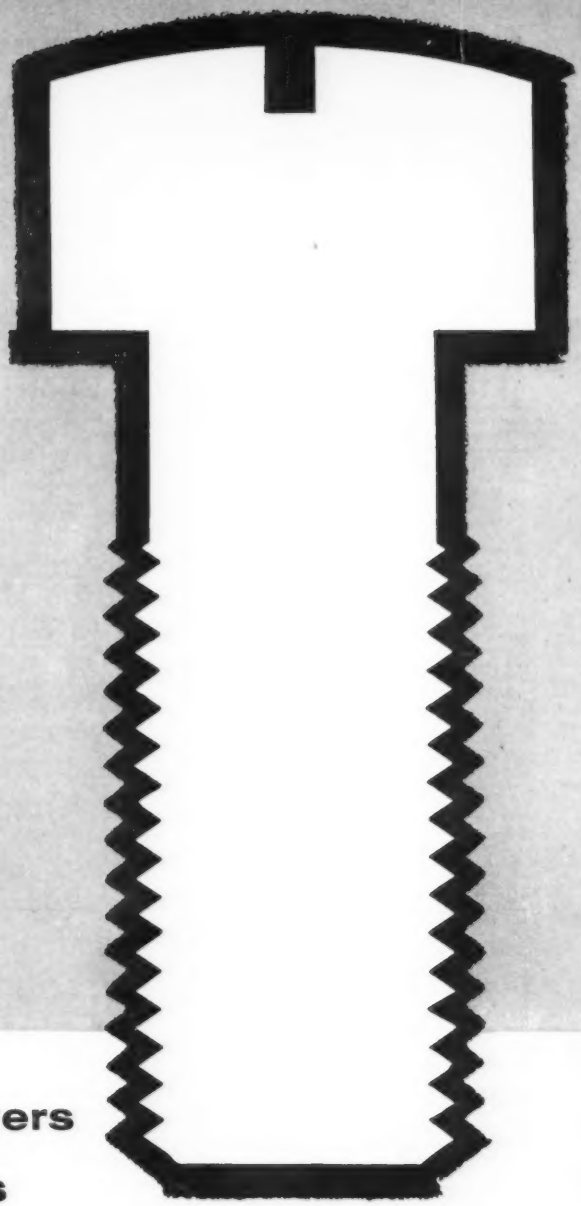
Cities	City Delivery‡ Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.59	9.67	10.13	8.91	9.29	9.40	9.39	13.24*				
Baltimore	$.10	8.65	9.35	9.09	9.15	9.10	9.65	9.55	11.80*	16.28	15.28	19.82	19.08
Birmingham		8.18	9.45	10.46	8.51	8.89	9.00	8.99					
Boston	.10	9.41	10.50	12.07	9.84	10.12	10.11	10.21	13.45*	16.79	15.79	20.29	19.56
Buffalo	.15	8.40	9.75	11.00	8.90	9.35	9.40	9.30	11.60*	16.34	15.55	19.01	19.30
Chicago	.15	8.40	9.60	11.05	8.66	9.04	9.15	9.14	9.30	16.20	15.20	19.70	18.95
Cincinnati	.15	8.58	9.65	10.70	8.98	9.42	9.71	9.46	11.68*	16.52	15.52	20.02	19.27
Cleveland	.15	8.51	9.69	11.51	8.78	9.28	9.54	9.25	11.40*	16.31	15.31	19.81	19.06
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19				20.84
Detroit	.15	8.66	9.85	11.40	9.03	9.41	9.71	9.45	9.66	15.46	15.48	18.81	19.23
Houston		8.10	8.60		8.15	8.45	8.05	8.10	11.60	16.20	15.25	19.65	18.95
Kansas City	.15	9.02	10.27	11.37	9.33	9.71	9.82	9.81	10.22	16.87	15.87	20.37	19.62
Los Angeles		8.70[8]	11.20–11.80	12.20	9.15	9.10	9.00	9.10	12.95	17.30	16.35	21.30	20.60
Memphis	.15	8.55	9.80		8.60	8.93	9.01	8.97	12.11*				
Milwaukee	.15	8.54	9.73	11.19	8.80	9.18	9.37	9.28	9.54	16.34	15.34	19.84	19.09
New York	.10	9.27	10.59	11.20	9.74	9.87	9.84	10.09	13.35*	16.16	15.60	20.10	19.35
Norfolk	.20	8.20			8.90	8.65	9.20	8.90	10.70				
Philadelphia	.10	8.30	9.35	10.44	9.35	9.25	9.20	9.50	12.05*	16.58	15.58	20.08	19.33
Pittsburgh	.15	8.50–8.60	9.70–9.95	11.05	8.76	9.05	9.15	9.14	11.40*	16.20	15.20	19.70	18.95
Portland		10.00[1]	11.75[2]	13.30[3]	11.95[4]	11.50[5]	11.10[6]	9.85[7]	15.30*	18.50	17.45	20.75	20.25
San Francisco	.10	9.75	11.20	11.50	9.85	10.10	9.95	10.25	13.70	17.05	16.35	21.05	20.60
Seattle		9.95	11.55	12.45	10.00	9.70	9.80	10.10	14.70	17.15	16.80	20.65	20.60
Spokane	.15	10.10	11.70	12.60	10.65	9.85	9.95	10.75	14.85	17.75	16.95	21.55	20.75
St. Louis	.15	8.78	9.98	11.43	9.04	9.42	9.63	9.52	9.93	16.58	15.58	20.08	19.33
St. Paul	.15	8.94	10.19	11.64	8.99	9.45	9.53	9.70[7]	10.16		15.41		19.21

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **All sizes except 18 and 16 gage.

†† 10¢ zinc. ‡ Deduct for country delivery. * C1018—1 in. rounds. [1] 10 ga. x 36" x 120"; [2] 20 ga. x 36" x 120"; [3] 26 ga. x 30" x 96"; [4] 4½" x 1" in lots of 1000 to 9999; [5] sheared plate ¼" x 84" in lots of 1000 to 9999; [6] 3" x 5.70" in lots of 1000 to 9999; [7] M-1020—1-in. rounds in lots of 1000 to 9999; [8] 15 ga. & heavier.

(Effective Feb. 23, 1959)

HOW YOUR REPUBLIC BOLT AND NUT DISTRIBUTOR CAN HELP YOU...



Find close-at-hand answers to any fastener problems

Proximity is one of the great advantages you enjoy when you do business with your local Republic Bolt and Nut Distributor. He and his staff of fastener experts are no farther away than the length of your arm—the distance to the telephone on your desk.

Even more important, your distributor is always nearby for personal, face-to-face consultation. When problems arise requiring the use of special types of fasteners, or special fastener techniques, he is ready to help you find a quick solution.

He has had wide experience with a diversity of fastener problems in your own particular locality. Moreover, he is backed up by the know-how of the experts at Republic Steel—a company whose fastener background spans a century. In all probability, your local distributor is well acquainted with your industry and business, and perhaps with you yourself.

Whatever your special needs or problems may be, you can count on your local Republic Bolt and Nut Distributor for personalized home-town help. Get better acquainted with him soon.

Call your local distributor for quick deliveries of...

REPUBLIC Bolts and Nuts

REPUBLIC STEEL

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.60	68.50	69.00	69.50	.....
Birmingham *R3*	62.00	62.50*	.....	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	.....
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	66.50	67.00	67.50	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	.....
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4* (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $103.50; (15.51-16.00), $106.50. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add $1.25 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under .10 pct phos.): $64.00. Add $1.00 premium for all grades silvery to 18 pct.

† Intermediate low phos.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	42.00	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	49.50	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	47.00	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6;* Gary, *U1,* (25¢ per lb. higher).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8.*

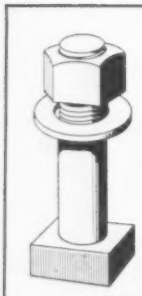
Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8.*

(Effective Feb. 23, 1959)



WESPO

T-BOLTS & BOLSTER BOLTS

ALLOY STEEL 150,000 LBS. TENSILE STRENGTH

T-Bolts-½", ⅝", ¾", ⅞", 1" Body Diameters

Bolster Bolts to J.I.C. Standards

Special bolts available to 1½" body diameter and 3" Square Head. All bolts except ½" and ⅝" available with Hexagon Heads . . . Hardened Nuts and Ground Washers available for all size bolts.

TWX—DE 894

Write for bulletin-prices

WEST POINT MFG. CO.

26943 West 7 Mile Road • Detroit 19, Michigan

PERFORATIONS

UP TO ½" IN STEEL 60" WIDE

The most productive and modern perforating equipment in the world is at your service when you deal with Accurate. This means lowest cost—precision perforating. Versatile Accurate Perforating has hundreds of dies ready for service—and is equipped to develop unlimited patterns. Let us help you solve your perforating problems. Write for our FREE catalog A-17.

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ACCURATE

perforating company

3632 SOUTH KEDZIE AVENUE • CHICAGO 32, ILLINOIS

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	38.00
0.05% C....	39.00	1.00% C....	37.75
0.10% C....	38.50	1.50% C....	37.50
0.20% C....	38.25	2.00% C....	37.25

4.00-4.50% C, 60-70% Cr, 1-2% Si.. 28.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 28.25
0.025% C (Simplex) 36.75
8% max C, 50-55% Cr, 6% max Si. 25.75
4½% max C, 50-55% Cr, 2% max Si 26.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97.25% min. Cr, 1% max. Fe.
0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.
Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.)
Carloads, delivered, lump, 3-in. x down, packed.
Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	28.25	14.60
Ton lots	33.50	16.05
Less ton lots	35.10	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.
Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.
Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.
Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload packed 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	12.25
Johnstown, Pa.	12.25
Neville Island, Pa.	12.25
Sheridan, Pa.	12.25
Philo, Ohio	12.25
S. Duquesne	12.25

Add or substract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:
Carloads, bulk 14.80
Ton lots packed in bags 17.20

Spiegeleisen

Per gross ton, lump, f.o.b. Palmerton, Pa., and Neville Island, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$100.50
19 to 21%	3% max.	102.50
21 to 23%	3% max.	105.00

Manganese Metal

2 in. x down, cents per pound of metal delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.
Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.
Carloads 34.00
Ton lots 36.00
250 to 1999 lb 38.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 25.50

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn (Bulk)	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	33.60	36.40	37.60
0.30% max. C	32.10	34.90	36.10
0.50% max. C	31.60	34.40	35.60
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	28.60	31.40	32.60

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.
Carloads bulk 12.80
Ton lots, packed 14.45
Carloads, bulk, delivered, per lb of briquet 15.10
Briquets, packed pallets, 3000 lb up to carloads 16.30

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe..	24.95	23.65
98% Si, 1.0% Fe	24.45	23.15

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.
Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.60	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
	90% Si....	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.
Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb..	2.40	3.30	4.55

(Effective Feb. 23, 1959)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.
Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 50-60% lb, 2 in. x D, delivered per pound contained Cb.
Ton lots $3.90
Less ton lots..... 3.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $240.00

Ferrotungsten, ¼ x down packed, per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.
Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy 35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Bortram, f.o.b. Niagara Falls.
Ton lots per pound ..... 45¢
Less ton lots, per pound ..... 50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 14.00¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.. $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb and over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 3.15

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(2) S.S. 645-H.P. Mill Motors, each 300-V.D.C. 1000 R.P.M. (used with above 1060-K.W. Gen.)
(2) S.S. Reel Motors (mill type) each 940-H.P. 800/1000 R.P.M., 600-V.D.C. (used with above (2) 760-K.W. Gen.). We will sell the above complete PACKAGE or segregate it to suit your REQUIREMENTS with necessary CONTROLS.

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Midwest Sales Show Slight Gains

Used machinery sales in the Chicago area are still hampered by credit problems.

But orders from out-of-town buyers are helping keep the market moving.

▪ Used tool sales in the Midwest are showing mild gains. Part of the gain—about a 10 pct increase in dollar volume—is due to orders from Detroit buyers. In addition, tool orders have been coming in from the Southeast, the Southern Mississippi area, and the West Coast. Chicago sales have scored a slight gain, but not what had been expected earlier.

Sheet Equipment Disappoints—For instance, booming sheet sales had led some used tool sellers to expect sharper gains in sheet metal forming equipment. But it now appears that too much of this steel is going to customers who will use it for inventory purposes. One tool seller, for instance, just rented out one of his warehouses to a manufacturer who will use the property to store steel against the possibility of a steel strike.

Credit Pinch Hurts — Another problem affecting sales—the tight local credit situation. Some name manufacturers are stretching their credit as much as 45-60 days. Equipment sold in December is, in a number of instances, still unpaid.

This hurts two ways. Potential buyers can't make additional purchases until they can scrape up more bank credit. And used tool dealers are, in many cases, short of cash to build up their inventories against the usual spring upswing.

Reasons for Hope — Despite these negative aspects, the general tone of dealer and rebuilder feeling in the Midwest is optimistic. Inquiries are running at their strongest rate since last fall. The rash of sales to out-of-town buyers has been another shot in the arm. A fairly good level of orders for heavy, specialized tools is another source of hope.

Certainly, the hoped-for early '59 upswing didn't show the strength expected. But there is a solid, steady rate of gain looking as if it will last at least into early June. Much of this gain is in the heavier, higher-profit tools.

Defense Orders Help — Light, general purpose equipment has, if anything, slipped slightly from late '58 levels. An upswing in light tools is expected. Some dealers feel, if credit hadn't been tight there would already be a noticeable upswing in the lighter equipment.

A welcome newcomer on the scene has been some new buying for defense program work. A mild flurry of heavy tools for missile and aircraft plants hit the area and roused some hopes last fall. With more missiles moving up to the manufacturing stage, it's hoped the current rise in defense ordering will be longer-lived.

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12' x ⅜" Hilles & Jones Pyramid Type
22' x ¾" BALDWIN PYRAMID TYPE—LATE
CRANES—OVERHEAD ELECTRIC TRAVELING
7½ ton P&H 60' Span 230 Volt D.C.
8 ton P&H 55' Span 230/3/60
10 ton P&H 50' Span 230 Volt D.C.
10 ton P&H 39' Span 230 Volt D.C.
10 ton Milwaukee 57' Span 230 Volt D.C.
10 ton Shaw 48' Span 230 Volt D.C.
10 ton Whiting 75' Span 230/3/60 A.C.
10 ton Shaw 130' Span 230 Volt D.C.
15 ton P&H 50' Span 230 Volt D.C.
15 ton N-B-P 100' Span 230/3/60 A.C.
120 ton Shepard Niles 77' Span 230/3/60
CUT-OFF
Modern Model 2E, Capacity ⅛" to 2" dia.
DRAW BENCHES
7,000 lb. Draw Bench, 51 ft. Draw
10,000 lb. Draw Bench, 50 ft. Draw
35,000 lb. Draw Bench, 41 ft. Draw
50,000 lb. Draw Bench, 20 ft. Draw
FORGING MACHINES
1" to 5" Acme, Ajax, National
GEAR REDUCERS
3000 H. P. United (2), Ratio 16.3-1 & 11.6-1
HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING 800 lb. to 12,000 lb. incl.
HEADER
#44 Waterbury Farrel DSOD, Capacity ⅝" x 6"
LEVELERS—ROLLER
12" Waterbury Farrel 9 Rolls 6" Dia.
24" McKay 17 Rolls 2⅝" Dia.
66" Guide 17 Rolls 4½" Dia.
84" Bliss 17 Rolls 5⅛" Dia.
MOTOR
800 H.P. Westinghouse 2200/3/60 505 RPM
NIBBLER
Pullmax Model Major 2, Capacity 11/32"
PRESS—EMBOSSING & COINING
#664 Toledo 600 ton, 2" Stroke
PRESSES—HYDRAULIC
300 ton Southwark, Bed 28" x 28", Stroke 25"
500 ton Watson Stillman Piercing Press, 48" x 72"
500 ton HPM Fastraverse, Bed 36" x 36"
1000 ton HPM Fastraverse, Bed 48" x 72", 36" Stroke
4500 ton B-L-H Bed 68 x 68", Stroke 40"
PRESSES—Straight Side
100 ton Toledo #57½, Bed Area 29x29", Stroke 16"
215 ton Clearing, Bed Area 36x42", Stroke 24"
260 ton Cleveland #7F, Bed 42x84", Stroke 12"
500 ton Hamilton #1816¼, Area 19x17½" Stroke 1¼"
900 ton Hamilton 4E-1809, Bed 101x181", Stroke 30"
PRESS—TOGGLE DRAWING
Bliss-Toledo #168⅝, Bed Area 48x51", Stroke of Blankholder 18", Stroke of Plunger 26"
PUMP
250 GPM Aldrich Vertical Triplex 4⅝x9", 1500# Pressure, with 250 H.P. Motor 2300/3/60
PUNCH & SHEAR COMBINATIONS
#1½ Buffalo Universal Ironworker
EF Cleveland, 60" Throat
ROLLING MILLS
6" x 5" Torrington Flat Wire Mill Line
3¾" x 7" Six Roll Cluster Mill
10" x 14" Single Stand Two High
16" x 16" Single Stand Two High
12" x 12" Single Stand Two High
12" x 16" Single Stand Two High
16" x 24" Two Stand Two High
20" x 36" Single Stand Two High
26" x 60" Single Stand Two High
ROLLS—FORMING
6 Stand Dahlstrom #450-6 for stock to 4⅛" wide
18 Stand Custom Built, 2⅛ Shaft, will take 36" wide
SHEAR—ROTARY
#40A Quickwork Whiting, ⅛" Capacity
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6" x 14 Ga. Edwards, Motor Drive—LATE
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24" Torrington Slitting Line, 3½" Arbor
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Torrington #1734 12-Roll, Capy. 1¾", Rd. 1-9/16"
⅝" Shuster Straightener, 12 Ft. Cut-off
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#4 Torrington 2-Die, Capy. 2" Tube, ⅝" Solid
#6A Fenn, Capy. 3¾" Tube, 1¼" Solid, 10" Die Length, With Hydraulic Feed
TESTING MACHINES
20,000 lb. Baldwin Univ. Hydraulic
50,000 lb. Baldwin Southwark Compression
60,000 lb. Southwark-Emery Universal Hydraulic
100,000 lb. Olsen Universal Hydraulic
100,000 lb. Olsen Universal Beam Type
500,000 lb. Olsen Super DeLuxe Compression
TUBE REDUCERS
1½" Tube Reducer for steel
2½" Tube Reducer for steel
WIRE DRAWING MACHINES
Type B Morgan 4-Block Capy. #5 Rod down
Scudder 3-Block 20" Dia.
Superior 7-Draft Cone Type, Capy. 14 Ga. down to .0364
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Model U, 14"x24" centers LoSwing, m.d.
No. 9WSL, Reid Production, m.d.
17"x75¾" LeBlond, m.d.
No. 10 Sundstrand Automatic Production, m.d.
No. 12 Sundstrand Automatic Production, m.d.
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Lipe Semi-Automatic Carbo Lathe, m.d.
13"x12¼" centers LeBlond H.D. Rapid Production, m.d.
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Colburn Mfg. Bench Type Speed Lathe, m.d.
Model NA28 Schauer Speed Lathe
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No. 2K Kearney & Trecker, m.d.
No. 3VG Reed Prentice Vertical Miller & Die Sinking Machine, m.d.
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1	800	Whse.	CW	550	1776
1	700	A.C.		2300	500
1	600	Whse.	CW-4-32D-15	440	1778
1	500	G.E.	MT-412	2200	439
1	500	Whse.	CW	550	350
1	350	Cr.Wh.	Size 718R	208/416	1765
1	350	G.E.	IM-17A	220/440	720
1	350	Whse.	CW-16-39C-15	440	720
1	250	G.E.	IM-16	220/440	875
1	250	G.E.	MT563Y	220/440	875
1	250	A.C.	Any	550	600
1	250	Whse.	CW	2200	450
1	250	Cr.Wh.	Size 29Q	2300	350
1	250	G.E.	MT-424Y	4000	257
1	250	G.E.	IE-13B	220	1800
2	200	Whse.	CW-890	2300	1775
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1	200	Cr.Wh.	SR-26QB	440	505
1	200	G.E.	IM-17A	2200	435
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1	800	G.E.	KT-573	2200	1180
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4	500	Whse.	CS-1216	2200	500
1	400	Whse.	CS-7151-610H	6600/4000	3585
1	300	Whse.	CS-1002	2300/440	600
2	200	Whse.	CS-855S D.P.	220/440	1750
1	150	G.E.	FT-558	2200	875
1	150	Whse.	CS	440	580
1	125	Whse.	CS-764C	220/440	1160
3	100	Whse.	CS-760C	2200/440	1100

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1	2500	Whse.	.8P.F.	2300	720
1	2000	G.E.	ATI	2300	900
2	1750	G.E.	ATI	2300	3600
1	1750	G.E.	TS	2300/4600	900
1	735	G.E.	ATI	2200/1200	600
2	700	G.E.	TS .8P.F.	2200	1200
1	200	G.E.	IM	440/2200	580
1	350	Whse.	1.0P.F.	440	900
2	350	G.E.	ATI 1.0P.F.	2300	150
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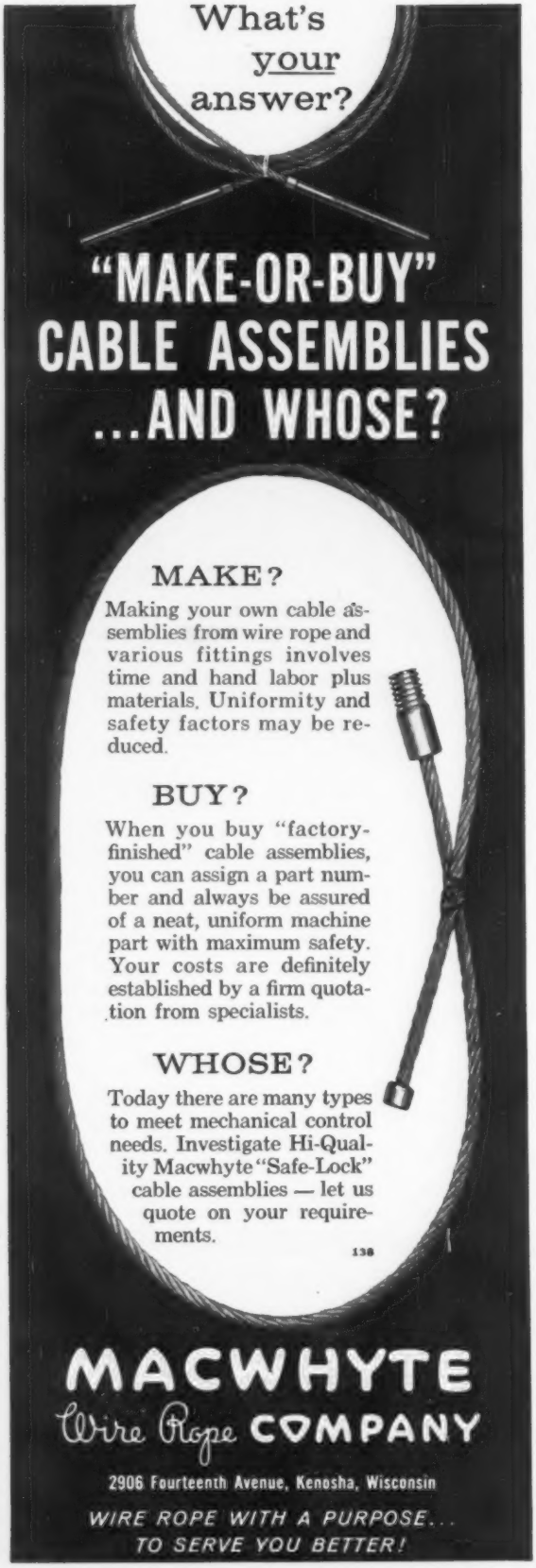
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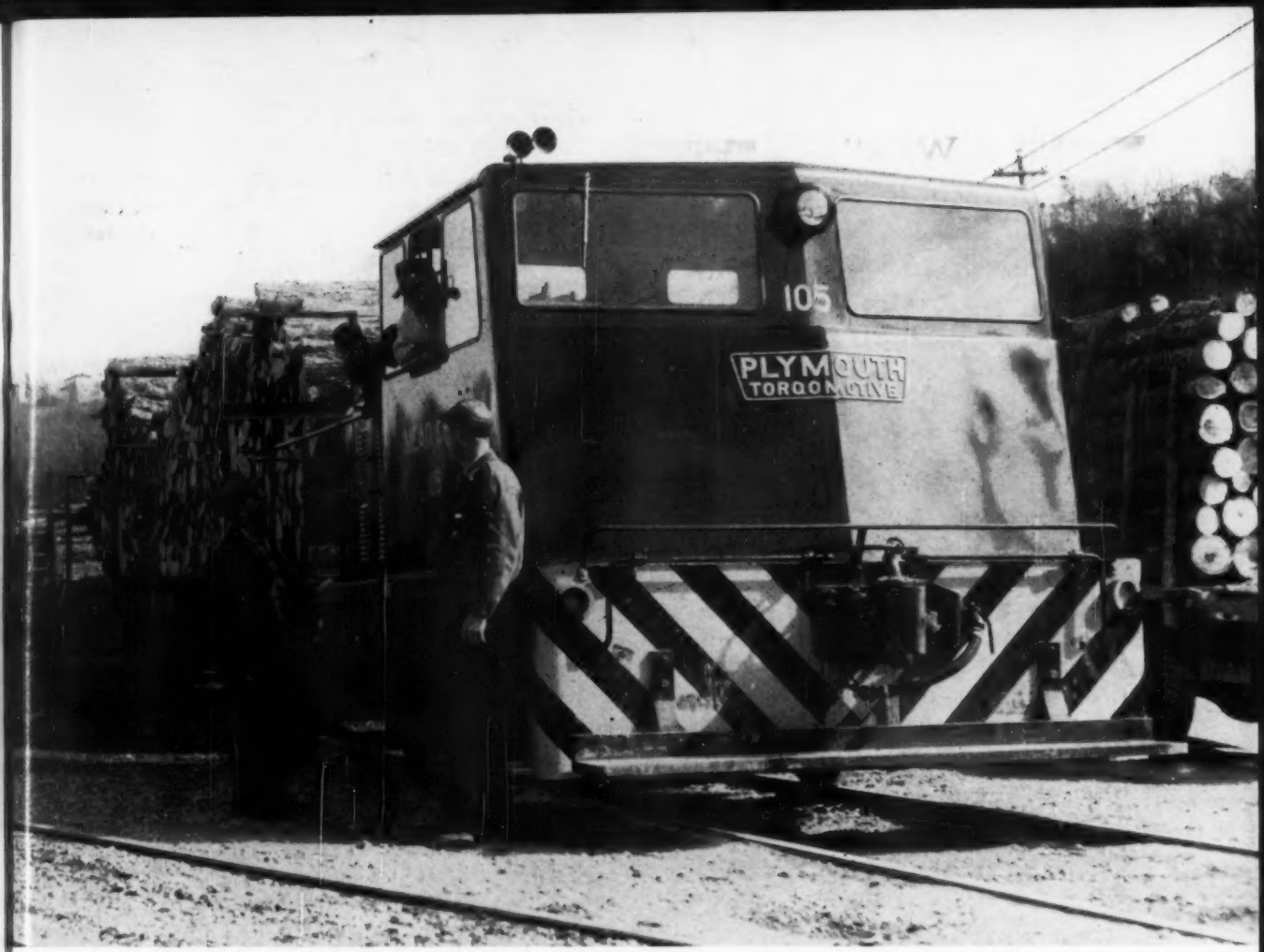

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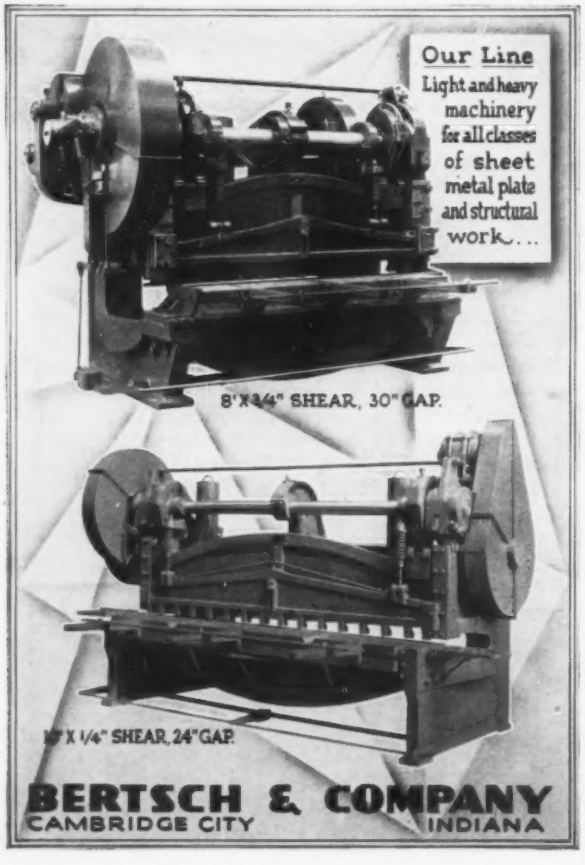
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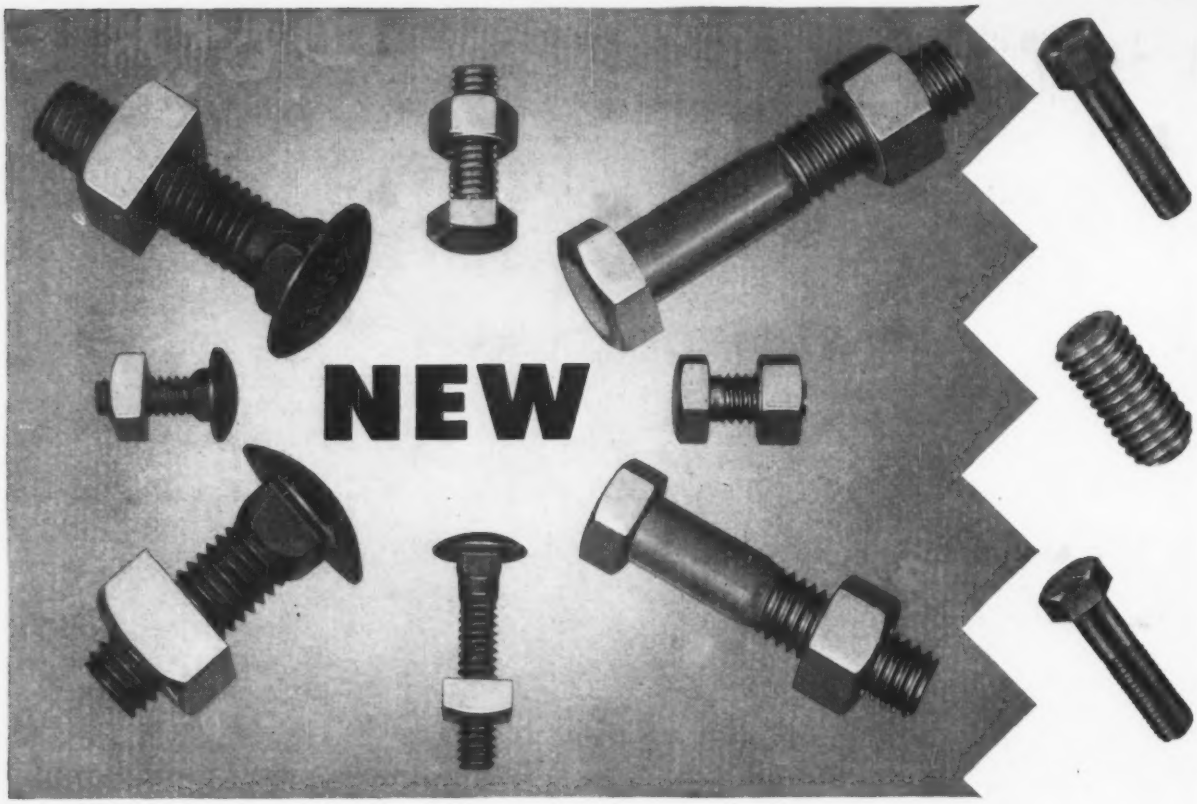

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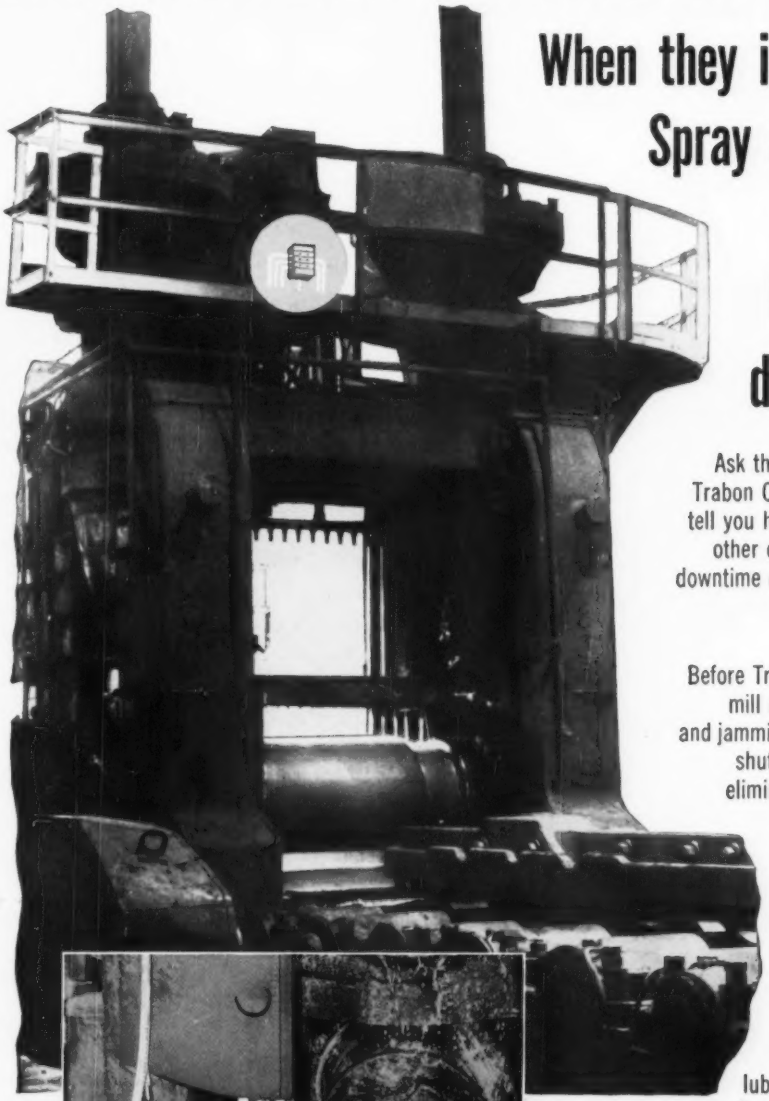

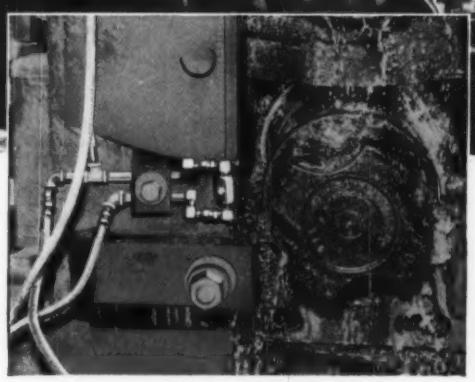

Insets show a Trabon feeder and two spray nozzles protecting roll neck bearings on a 40" mill. Despite heat, water and dirt, Trabon delivers an exact, metered amount of lubricant to all bearings automatically.

When they installed a Trabon Spray System here... they saved several hundred thousand dollars in six years

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Trabon Engineering Corporation

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